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ABSTRACT

This document contains the texts of seven invited presentations and six juried papers from a symposium on the uses of computer conferencing in teacher education and human resource development. The invited presentations include the following: "Computer Conferencing in the Context of Theory and Practice of Distance Education" (Michael G. Moore); "An Introduction to Computer Conferencing: A Look at Software Available in the Academic World" (Alex Cruz); "Delivering Credit Courses by Computer and Other Observations" (Donald R. McNeil); "The Fully Electronic University, or, Mind Expansion without Drugs" (Edward B. Yarrish); "Teaching by Computer Conferencing" (Linda Harasim); "Guidelines for Conducting Instructional Discussions on a Computer Conference" (Mark E. Eisley); and "Developing a Learning Community in Distance Education" (Robin Mason). Juried papers are as follows: "Extending the RJ-11 Connection for Audio and Computer Conferencing" (Larry Hudson, Robert Paugh, and Phyllis Olmstead); "Telecommunications Networks in Action: An Inter-University Project" (Constance Pollard, and Valerie Akeyo); "Electronic Mail, Conferencing, and Student Teaching" (Paul E. Post); "A Focus Group Report on Religious On-Line Education" (James T. Roberson, Jr.); "Research and Development Activities Regarding Opportunities and Problems with Computer Conferencing for Rural America" (Ronald M. Stammen); and "Examining Computer Conferencing as a Technique for Enhancing Personnel Development Activities" (Robert M. Torres et al.). The first appendix lists the affiliations of the principal speakers and presenters of juried papers; the second appendix provides names, addresses, and electronic mail listings for conference participants. (KC)

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Applications of Computer Conferencing To Teacher Education and Human Resource Development

Proceedings from an International Symposium on Computer Conferencing at The Ohio State University Columbus, Ohio June 13-15, 1991

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Applications of Computer Conferencing To Teacher Education and Human Resource Development

Edited by:
Aaron J. Miller
1991

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Preface

The 1991 Ohio State University "Computer Conferencing Conference" was permeated with both substance and an innovative spirit. Proceedings volumes typically capture the substance of meetings but rarely do they capture the spirit. This volume does capture a bit of the spirit—a spirit that kept the attendance at the same level at Saturday noon as at the opening session on Thursday morning.

Much educational effort around the world is in one way or another an effort to understand the world, its people, and its phenomena. A common theme that runs through many of the papers in this Proceedings is the potential for firsthand information and immediacy in communication. The impact on education is just beginning to be felt. Even Jules Verne would not have envisioned going around the world in 80 seconds. Today's student doing a geography project on Japan can logon and get his or her questions answered by someone in Japan.

The authors here have envisioned better education through computer conferencing. They have described their experiences in distance education, the supervision of student teachers, electronic focus groups, and many varied forms of interactive electronic education. Impressively, they have related their experiences to our existing learning theory and other relevant databases. In so doing, they make a major contribution to the creation of a database on interactive electronic education.

Gilbert A. Jarvis
The Ohio State University

Acknowledgements

The process of education and human resource development has changed radically during the past 15 years. One major factor contributing to this change is the use of the computer and computer dedicated communications. The International Symposium on Applications of Computer Conferencing To Teacher Education and Human Resource Development provided a forum for examining the latest practices and issues related to the use of computer mediated communications, and specifically computer conferencing, to education and training.

Sincere appreciation is expressed to the Department of Educational Studies and the College of Education for financially supporting this symposium. Also, our special gratitude and recognition is given to the Academic Computing Services, and The Center on Education and Training For Employment for their support in planning and providing special technical expertise and professional staff time in the conduct of the symposium.

Aaron J. Miller
Symposium Coordinator

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Computer Conferencing In The Context Of Theory and Practice Of Distance Education

by
Michael Grahame Moore

1. Introduction/background

The first attempt in English to define distance education and to articulate a theory of this form of education appeared in an article called "Toward a theory of Independent Learning and Teaching" published in *The Journal of Higher Education* in 1973 (Moore, 1973). This theory, sometimes called the two-dimensional theory was an attempt to identify the "macrofactors" of distance education, i.e. the basic variables or factors that provide the frame that contains all those teaching learning activities called distance education. The theory has been cited in numerous articles, chapters, and dissertations and most books about distance education. It was chosen as one of the world's six most significant theories by the Australian writer, Keegan (Keegan, 1980, 1986). Another prominent writer on distance education, Borje Holmberg of The German Federal Republic has also cited the theory in many articles and papers, most notably in his book Growth and Structure of Distance Education (Holmberg,1986). In Britain, Greville Rumble said the theory contained "the most fruitful use of the term 'distance'", and used it to orient readers of his book The Planning and Management of Distance Education (Rumble, 1986). The most recent treatment is by the Americans Verduin and Clark, (1991).

2. A working definition of distance education is:

Distance education consists of all arrangements for providing instruction through print or electronic communications media to persons engaged in planned learning in a place or time different from that of the instructor or instructors.

As defined, distance education consists of a whole family of teaching-learning relationships ranging from the largely self-directed through to the most highly organized programs; from interactions between single learners and individual tutors, to group learning, to community education, to education and training in organizations. What distinguishes this large family of educational transactions is the separation between learner and teacher, so that the communication between the two that is necessary in every educational transaction is transmitted through media, i.e. printed study guides, television or radio broadcasting, telecommunications media, correspondence instruction through the mail, audio and video recordings, computers, and various combinations and variations of these. Programs are designed in which instructors and learners carry on the dialogue across space and time that traditionally and conventionally occurs face-to-face. At the simplest level these programs might be print-only self-study packages for use by highly independent students. More often courses are taught through two or more media, such as study guide with correspondence; study guide, audio-tape and correspondence; teleconference and study guide; television broadcast, study guide and face-to-face class. In theory there should be, (and often is in some overseas Open Universities) full integration of all such media: study guide, broadcasting, recordings, correspondence, face-to-face classes, computer-accessed data and interactions, teleconferences, and even kits of electronics or chemicals for experimentation in the student's home.

3. Learning and teaching

A great deal of spontaneous learning takes place through every day interactions with other people in face-to-face encounters. Much learning also occurs through interaction with the ideas and influence of others through communications technology, especially audio and visual recordings, telecommunications, and through personal computers. However, in the same way that educators do not study all interpersonal interactions, neither do we study all communications through technology. Communication across distance is not itself education, but in distance education there is communication across distance between one or more persons engaged in planned learning and one or more who deliberately teach.

As educators, our interest is only in those communications that are structured, and designed with a primary purpose of facilitating learning. It is true that we learn in the psychologist's use of that term, from casual or accidental interactions with communications media just as we learn from all other stimuli but, as educators, we are concerned only with learning that is intentional. In Tough's words, "There are lots of activities that lead to learning, but if that is not the person's primary intention, we do not include it in our definition of a learning project" (Tough 1971).

That's not to say that we are only interested in formal academic learnings. In distance education, we are concerned with ALL deliberate, planned learning where there is separation of the learner in space and/or time from the source of instruction.

4. Distance Teaching

Like other forms of education, distance education is a two-sided relationship. It is a transaction between learners and educator. Just as learning that we study is intentioned, so too is the behavior of educators. The intentions of educators include: deciding what people might want to learn or what society or an organization wants them to

learn; presenting information; organizing practice; bringing the learner to certain experiences; giving support, guidance and motivation; arranging for feedback and evaluation. All this is deliberately planned and presented.

5. Educational philosophy

Distance education is driven by the same variety of educational philosophies that we find in education generally. There are distance education programs and institutions characterized by programs that are based on an information processing theory of learning, programs based on behavioristic training approaches to learning, and, though less common, programs based on concepts of humanistic self-actualization and on educational philosophies and theories of social change. For the educator who would follow a Freireian or Antigonish type of approach to social reconstruction through adult education, distance education technology could be a powerful tool. For the humanist who would facilitate individual self-actualization through adult education following a Maslow-Rogerian approach, distance education technology could also be a powerful tool. Distance education technology has for some time been a powerful tool for trainers in the corporate sector and the armed forces and elsewhere who have made it possible for adult learners to acquire new vocational skills regardless of their geographic location or the location of expert resources, with learners learning in their workplaces, and instruction provided through communications technology.

6. Evolution of distance education

As has been pointed out by Miller (1990), the university campus and its classroom are types of educational "delivery system" that have their origins in the technology, economy, and social environment of pre-industrial Europe. At that time in that place education was for only the male children of the aristocracy, and there were few scholars and books. Under these circumstances the best form of communication for the purpose of education was to bring students together in one place for a period of time to learn from the masters. Many of our educational problems today arise from the inability of an educational system that is organized as classroom instruction to adjust to changes that have occurred in the population of students, the ownership of knowledge, and the media of communication. The entrenchment of the old delivery system in fact leads to barriers such as have been described by Dirr (1990), most importantly, barriers of place, time, access to resources and barriers of cost. He goes on to point out, as does Miller the changes that have occurred in the demography of education. An increasing proportion of students are adult, mobile and unwilling to devote full time to study. Education is now considered a universal right, and increasingly it is expected to continue through life. As for knowledge, it is no longer the property of a small non-laboring elite, and is sought for more utilitarian reasons than it was by them.

Against this background of change in the assumptions about education, has come an evolution in understanding of the ways in which communications media can be used in teaching. In this evolution, two events stand out in particular. The first was Charles Wedemeyer's experiments between 1963 and 1966 at the University of Wisconsin when he attempted to "articulate" or join together, instruction by new, electronic communications media and traditional correspondence teaching. This was the first full scale test and development of the hypothesis that the activity of teaching could be broken into constituent acts and a variety of media used, selectively, to deliver the instruction to the distant learner, more effectively than by correspondence or any other single medium alone (Wedemeyer and Najem, 1967). Following the success of the Articulated Instructional Media experiment, Wedemeyer was invited to Britain in 1968, and applied his experience in advising the British on the design of the British Open University. The establishment of the Open University was the second milestone in the evolution of modern distance education. It proved the effectiveness of teaching by integrated multi-media communications technologies and the benefits of specialization in the activities of course design, instruction, and learner support. It opened up continuing, potentially lifelong, education to adult learners in their homes and workplaces on a scale so large it has been described as "industrial". In the years since the Open University began instruction in 1970, more than a score of other similar large scale systems have been developed, from Venezuela and Canada in the west, through almost every European nation, to India, Pakistan to Indonesia, and the Australian States.

7. Institutional structures

As pointed out by Mark (1990), very little has been done to analyse distance education organizations in terms of any recognized organizational typologies or models. Most categorizations have been based on environmental dependence, i.e. is distance learning part of a larger institution or does it stand alone? Looked at in this way the organizations of distance education in higher education can be classified in the following way. A similar classification could be made in the corporate, military or other non-higher education sectors:

1. Distance Learning Institutions: These are purpose built, autonomous institutions each headed by its own Chief Executive Officer, with activities directed exclusively to distance education and distance learners.
2. Distance Learning Unit : this is a subunit, (in higher education, of a college or university,) EQUAL to other academic units organized within a traditional framework of governance.
3. Distance Learning Program. A subunit whose educational activities also include traditional classroom teaching. The Program usually does not have its own faculty, and provides mainly administrative support services.
4. Consortium. The educational activities are directed exclusively to distance education. The consortium is made up of Institutions, Units or Programs as defined above, and is headed by a director.

Examples of Institutions are: The American College, Athabasca University, Thomas Edison State College,

and Empire State College. University Independent Study Divisions represent Distance Learning Units, while examples of Consortia are the International University Consortium, and the National University Teleconference Network. A trend to internationalism in distance education consortia is represented by the Global University Consortium.

A review of the history of distance education over the past two decades suggests that we are now well into a new stage in its practice that could have consequences for its theory as significant as the conceptualization of distance education itself. This new phenomenon is the development, proliferation and reduction in cost of a new type of communications media that was only in the early stages of development in the U.S. when distance education theory was first conceptualized, and is still underdeveloped in other parts of the world. This is the family of teleconference media, i.e. the use of interactive computer networks and audio, audio-graphic, and video networks, which may be local, regional, national and international and are linked by cable, microwave and satellite. Such telecommunications are affecting, and are likely to affect even more all three dimensions of distance education: dialogue between learner and instructor, structure of course design, and the autonomy of the distant learner.

8. Effects of distance on educational organizations

The most obvious effect of distance between learner and instructor is that communication between them has to be through an artificial communications medium. The most common of these include: printed publications of many kinds; writing, usually known as correspondence study; broadcasts by radio or television; audio and video recordings; narrowcasts to special receivers by cable, satellite, or microwave; interactive teleconferences by computer, telephone, and two way video. Most good distance education programs use combinations of these media. Print serves well as the medium for communicating the basic framework of a course and providing in-depth analysis and dense information loads, while the electronic recorded media bring color and highly motivating visual and audial stimuli; the new teleconference media not only provide intimate instructor-learner contact, but allow inter-learner interaction, leading to collective learning and to the potential for learner participation in program design, implementation, and evaluation.

If artificial communication is a distinguishing characteristic of distance education, other significant characteristics arise from it. Most importantly, because communications media require very specialised skills, and because the media differ in their suitability for different instructional processes, the various activities traditionally grouped under the term "teaching" are, in distance education, the work of different specialists. In other words, in distance education there is a division of the labor of teaching.

Communications hardware and the labor of communications specialists is expensive, and the total cost of a distance education course is usually much higher than conventional courses. However the distance education course can be distributed over a wide geographic area to much larger audiences than conventional instruction, and so the higher costs can be amortized over a larger student body. When large numbers receive instruction through broadcast, print or recorded media it may be very impersonal. Properly organized distance education systems arrange for interpersonal, student-tutor interaction through correspondence, teleconferencing and even occasional face-to-face meetings. As a result the learner in distance education may receive less structured, more dialogic, and less distant instruction than in conventional education.

To ensure that the work of the various specialists is integrated and the various parts of a course are produced on schedule, and the instruction is effective in a population that is not only large but also very diverse, the distance education organization employs instructional technologists who control the process using systems design principles.

The above features, division of labor, use of expensive capital, systematic design and production of materials, and their large scale use, add up to a revolutionary change in teaching, substituting space-age technology for traditional cottage craft. It was the inability of established educational institutions in most countries to restructure their human and other resources to take advantage of new communications media and to develop new forms of teaching that led in the 1970's to the birth of a new type of educational institution. The adoption of this new form of educational provision in a wide range of cultural, economic, political and social environments, makes it one of the most international of educational phenomena and the most widely proliferating educational innovation of the late twentieth century.

9. Teleconferencing

In the United States the teleconferencing revolution is already underway. For example, satellite delivered programs at the university level are produced by and delivered to members of the National University Teleconference Network. In NUTN there are more than 260 organizations either providing or receiving a range of over 100 programs —live, by satellite, with programs in such areas as: aging, agriculture, A.I.D.S., child abuse, tax planning, reading instruction, engineering, interpersonal relationships, international affairs, marketing, medicine, and social and political affairs. Video teleconferencing through N.U.T.N. has been the medium of program delivery to as many as 6000 people at a time, located at some 200 receive sites. As well as taking NUTN transmission, many universities transmit their own satellite teleconference programs within to their state campuses and beyond. Well known among these are Oklahoma State, the University of Notre Dame, University of Maryland, California State College, Chico, and Penn State.

In the National Technological University, 24 of the country's major universities collaborate to produce about 500 post-graduate courses in engineering, delivered by satellite directly to more than 100 workplaces. Typical of N.T.U. programs was a project in which the Massachusetts Institute of Technology provided an updating program for electrical engineering faculty from 72 engineering schools across the nation.

In private business, more than 200 of America's biggest companies use satellite delivered, video conferencing. Typical of the efforts of dozens of major corporations to introduce video conferencing into their training programs is The Interactive Satellite Education Network (ISEN), IBM's satellite borne system. This is a one-way video, two-way audio network, with originating studios in four cities, and receive sites in thirteen. Other corporations include: Federal Express, with daily programs to 800 downlinks nationwide; Kodak Corporation sending twice weekly, two hour long, training programs, currently nationwide but with plans for an international network; Tandem Computers, broadcasting to eleven European countries as well as to 72 sites in North America; The AETNA Insurance corporation; and Domino's Pizza, whose Training Director sends his mobile uplink to any store in the country where an employee has something to teach the rest.

The American Telephone and Telegraph Corporation expanded from 5 videoteleconference sites in 1983 to 130 in 1987. Some 20,000 of their employees take courses by this medium each year. As well as corporation owned systems there are also a number of delivery systems that produce and sell programs or sell satellite time and production resources. In 1982 there were two such "business videoconference" networks; by 1987 there were over 40. Examples are The American Rehabilitation Educational Network, providing professional continuing education for health care professionals at nearly 100 sites nationwide. One of AREN's programs, Management Vision, has been transmitted to more than 650 sites.

Non profit making bodies use teleconference satellites in their continuing education programs, organized by The Public Service Satellite Consortium.These include The American Hospital Association, The American Law Institute, American Bar Association Committee on Continuing Professional Education, The National Education Association, The AFL-CIO, and the U.S.Chamber of Commerce. Well know examples of computer conference distance teaching institutions include the Electronic University Network and New York Institute of Technology.

In the schools area, audio, computer and satellite teleconferencing are in use though perhaps not to the extent of their use in adult and higher education. Examples can include TERC, one of the "Star Schools" projects, the Telelanguage program in Nebraska, in which students in 24 school districts have participated in high school audio conference instruction of modern languages; AT&T's "long distance learning network" in over 300 classrooms in 6 different countries. In 1986 there were some 600 schools in the U.S. with satellite receiving equipment. Among leading providers has been TI-IN the Texas based enterprise, sending some two dozen courses five days a week, and the Arts and Sciences Teleconferencing Service, of Oklahoma State University, offering German language since 1985, and Calculus, Physics history and government more recently.

10. Theory of Transactional Distance

Distance in distance education is not merely geographic, but is the psychological space between learner and teacher that arises from geographic distance and that through communications media has to be overcome. This has been termed "Transactional Distance" and has been defined as a function of two characteristics existing in all educational programs (Moore 1972, 1983). The first of these is the extent and nature of the dialogue occuring when a teacher instructs and a learner responds. Dialogue describes the extent to which an educational program provides for a learner and a teacher to conduct a series of responses to the stimulus of each other. This dialogue is determined to some extent by the subject-matter of the course, by the educational philosophy of the individual or group responsible for the design of the course, by the personalities of teacher and learner, and by environmental factors. The most important of these is the medium of communication. For example, an educational program in which communication between teacher and learner is solely by radio or television permits no dialogue; the student might make a response to a teacher, but no consequent response is possible. A programme by correspondence is more dialogic, yet not to the same extent as one taught by computer conference.

The second characteristic that determines transactional distance are the elements in the design of a course that are collectively referred to as its structure. Structure expresses the rigidity or flexibility of the program's educational objectives, teaching strategies, and evaluation methods and the extent to which these are prepared for, or can be adapted to, the objectives, strategies, and evaluation needs of a particular learner. Structure describes the extent to which an education program can accommodate or be responsive to each learner's individual needs. A linear, non-branching programmed text, or a recorded television program for example are both very highly structured, with virtually every activity of the instructor and every minute of time provided for, and every piece of content pre-determined. There is little or no opportunity for deviation or variation according to the needs of a particular individual. This can be compared with many correspondence courses which permit a wide range of alternative responses by the instructor to individual students' questions and assignment submissions. In the case of the programmed text and the television program, not only is the program highly structured, but teacher-learner dialogue is nonexistent and transactional distance therefore is high. At the other extreme, there is low transactional distance in those teleconference programs that have much dialogue and little predetermined structure. According to Rumble, "This conceptualization also helps explain how a student learning in a 'face-to-face' environment, whose sole educational activity is to go to lectures to take notes, can be at a greater transactional distance than a student on a distance education course who regularly meets, corresponds with, or telephones his tutor." (Rumble 1986 p8).

In programs with little transactional distance, the learner receives directions and guidance through both the structure of the course and dialogue with an instructor. In more distant programs, learners have to make many of their own decisions about study strategies. Even where a course is structured to give directions and guidance, in the absence of dialogue students may

decide for themselves whether they will be used, and if so when, where, in what ways, and to what extent. The greater the transactional distance, the more such autonomy the learner is required to exercise. This interrelationship between dialogue, structure and learner autonomy has intrigued many thinkers about distance education (See for example Moore, 1972; Garrison and Shale 1987; Keegan 1989; and Saba 1988).

11. Dialogue in instruction

It is apparent that the new technology brings into focus some new applications of the Two Dimension theory, since with older media there was only dialogue between the learner and the content that was studied and dialogue between the individual learner and instructor. Programs delivered by these media were more highly structured than are teleconference programs. Today, programs are relatively unstructured, but, even more important, new telecommunications mean there can be a new form of dialogue in distance education which is dialogue between learner and fellow learners. These changes demand new ideas about distance teaching as well as changes in our theorizing about distance education.

The first of the older forms of dialogue, based on interaction by the learner to the content of the subject is a defining characteristic of education. Without it there cannot be education since it is the process of intellectually interacting with content that results in changes in the learner's understanding, what we sometimes call a change in perspective, a change in the cognitive structures in the learner's mind. However, even such learner-content interaction is a form of highly structured learner-instructor dialogue, a dialogue between the learner and the person who in some distant place and time organized a set of ideas or information for transmission to, and interaction with an unknown distant reader, viewer, or listener. Such interaction may occur at any time in the study process. It is the primary form of dialogue that occurs when the learner is working with the recorded media whether print, audio or video. Some learning programs are solely content-interaction in nature. They are highly structured, one-way communications between subject expert, sometimes assisted by an instructional designer, and learner. In preparing instruction for learner-content interaction the educator can design written and recorded material that aims to motivate, make presentations, facilitate application, evaluation, and even a degree of student affective support. However the lack of dialogue between individual learner and educator makes these teaching procedures highly structured, not individual, leaving ultimate responsibility for maintaining motivation, for interacting with the presentation, for analysing the success of application, and for diagnosis of difficulty on the learners themselves, requiring a high degree of learner autonomy.

The second type of dialogue, regarded as essential by many educators and most learners is what occurs when a learner and an instructor communicate interactively by electronic media or by correspondence. The instructor may be the expert who prepared the subject material, or some other expert who specializes in such interaction. This is a two-way interaction that results in a more dynamic dialogue than that in the dialogue between expert and learner using a recorded medium, and programs that have it, being more highly dialogic and also less structured, are less distant.

The frequency and intensity of the dialogue between teacher and learner, and the extent to which the teacher can influence the learner in these ways is much greater when there is learner -teacher interaction than when there is only content-learner interaction.

Content and instructor interaction are both possible by teleconferencing. One of the benefits of teleconferencing is that content can be presented by computer, or on audio or video in real time by experts wherever located, or asynchronously on computer bulletin boards. A variety of learner-instructor interactions can be arranged, especially question/answer sessions in real time in audio and video conference, and more individual, longer and more thought out interactions by computer. Thus computer conference instruction permits highly dialogic instructor-learner interactions.

Instructors have dialogue with learners with the following aims in mind:

1. To support the learner's motivation and to give encouragement. Having planned or been given a curriculum, a program of content to be taught, instructors seek to stimulate or at least maintain the student's interest in what is to be taught, to motivate the student to learn, to enhance and maintain the learner's interest, including self-direction and self-motivation. By making unstructured, individual, personal teacher-learner contact and unstructured learner-learner contact possible, the personal computer can make a major contribution to learner motivation. This individualized aspect of computer communication also makes individual remedial study advice available. Such contact resembles that available to the instructor by a personal telephone call, with of course the benefit of asynchronicity.
2. Presentation. Every instructor makes presentations, or causes presentations of some kind to be made, whether of information, demonstration of skill, or modelling certain attitudes and values. The computer is able to present knowledge. By delivering text it has some characteristics of print, i.e. book, study guide. Before being used as an electronic page turner, decisions must be made regarding the shelf life of information to be presented, since the recorded media have certain advantages in this regard. For information with long shelf life, the computer has no great advantage over print, though it may be useful as a means of rapidly updating information and, used in this way it can be a supplement to print. It also may serve as an electronic library for persons who find access to hard copy libraries difficult.
3. Stimulate analysis, criticism, evaluation. These are higher order cognitive skills, not necessarily expected in all instruction, but expected in most higher education.
4. Give advice on study, teach study skills and help with study problems. Every instructor provides counsel, support and encouragement to each learner, though the extent and nature of this sup-

port varies according to educational level of the learners, teacher's personality and philosophy and other factors.

Where interaction between learner and teacher makes dialogue possible through teleconferencing the instructor is able to advise and help the learner interact with the content in the manner that is most effective for that particular individual. In computer based instruction, such individual advice can be communicated by e-mail.

5. Arrange practice, application, testing. Every instructor tries to organize the students' application of what is being learned, either the practice of skills that have been demonstrated, or manipulation of information and ideas that have been presented. Computer software can be provided to give excellent practice and application exercises, including simulation. In distance education in higher education the written assignment is still important, though could be delivered by pc and responded to quicker, which is good.

The instructor is especially valuable in responding to the learners' application of new knowledge. Whatever self-directed learners can do alone for self-motivation and interaction with content presented, they are vulnerable at the point of application since they do not know enough about the subject to be sure they are applying it correctly, or that they are applying it as intensively or extensively as is possible or desirable, or that there are not potential areas of application they are not aware of. It is for reality testing and feedback that

6. Evaluate learning. Every instructor organizes evaluation, to ascertain if the learner is making progress, and to help the teacher decide whether to change strategies. In some ways the pc may replace conventional writing, although there is danger in students losing conventions of writing if the computer note becomes the sole form of evaluation of writing.
7. Arrange student interaction.
8. Create knowledge.

12. Dialogue and structure in teleconference instruction.

The areas of student interaction and creating knowledge promise to be the pc's main contribution to distance education. Here is where the third form of dialogue by teleconference, ie. inter-learner dialogue is emerging as a challenge to the thinking and practice of distance education in the 1990's. Inter learner dialogue occurs by computer conference between learner and other learners, alone or in group settings with or without the real-time presence of an instructor. It is dialogue by teleconference between students that is making possible the creation of knowledge by students and the high level analysis, synthesis and critique of knowledge, the first of which goals has been unmanageable at a distance until now and the second which has been very difficult.

Through the history of education the class or educational group has more often than not been organized for reasons that have nothing to do with learners' needs. At the present time many classes are organized because the class is the only organizational form known to most teachers and because in the short term, though not usually the long term, it is the CHEAPEST way of delivering the teaching acts of stimulation, presentation, application, evaluation and student support. It must also be recognized that many classes and schools are organized for economic, social and political reasons that are not truly educational in origin.

In promoting learning however, dialogue among members of a class or other group IS sometimes an extremely valuable resource. Until now it has been impossible at a distance. It is the increasing availability of learner groups, either individuals at different locations who by teleconference can comprise a group, or groups of learners at different locations, joined by teleconference into larger groups that is opening up new teaching opportunities and causing us to rethink our concepts.

Until now it has been very difficult to organize learner-learner interaction. In the British Open University, face to face classes and summer schools are arranged for the purpose, but not all students are able or want to attend. In American correspondence education such face to face meeting is not a practice. Learners dialogue with instructors but not with other learners. A degree of interstudent activity can be organized by audio conferencing, if the numbers aren't too large, which they usually are, but the advantage of the pc is its combined asynchronicity and individuality. Not only can each individual student interact with the ideas of others, but this can be in his/her own time and own pace. This is something not available before in either distance education or conventional education. As well as providing a new dimension for distance learners it is likely to go some way to reducing the tyranny of the group in conventional education, for the slow and reflective student will be able to contribute as well as the quicker and more extrovert. There is potential here for improvement in quality of work prepared by students and also improvement in their participation in the creation of knowledge. This engagement of the "collective intelligence " is what Kowitz and Smith define as the third and most advanced form of instruction, after teaching basic knowledge and teaching technical abilities. It is referred to as collective training in the military and collective learning in recent thinking by instructional systems experts.

Most educators would like to see such creative and collective learning in school and college teaching as well as in distance education, and so we look forward to every conventional class of students having some element of distance education by keyboard and modem. The students' network would then not be the persons sitting next to them but other students wherever located in the country or the world. Then of course they will all be distance learners.

13. Adult learners and teaching by teleconference

Until now most people involved in the design and teaching of teleconference programs come from a background of teaching in school or university, or using the teleconference media in business communication. These are authoritarian environments not appropriate

for adult learning. The educational teleconference should not be just like a business meeting, nor should the teleconference for adult learners be like that for children. The teleconference for adult learners should be conducted on the basis of what we know about adult learning and instruction, and this includes what we know about the adult's propensity for autonomous learning. We know a lot about this, from both research and practice, because the self-directed, autonomous study circle is one of the oldest and most well established adult education learning methods. The following are some of what are generally recognized as major characteristics of the adult learner that should be taken into account when facilitating the teleconference group.

The adult learners.

1. Adult students are persons of experience and bring considerable knowledge to their course. The typical student knows more about one or more areas than other students and often the instructor also. Therefore, while students are looking for knowledge from the instructor and from literature, they are also expert resources for their peers and for the instructor. Teleconference media, including computer conferencing, are ideal for having students make presentations of their experiences and knowledge. What the instructor should not do in the presentation mode is is lecture at length. Persons familiar with broadcast media or with writing for academic publication often overstructure on teleconference, and miss completely the point that the media being used are interactive and therefore permit participation by everyone.

Such participation in presentation also reinforces or enhances motivation, including self direction. Often the student is aware of his or her expertise, and might feel resentment if it isn't used, or at least receives recognition. In other cases the student might be diffident and unsure that he/she really has something special to give, and is therefore stimulated by the experience of positive response to a presentation. In teleconferencing this means instructors must be careful to give everyone frequent opportunities to contribute, and be aware of who is and who is not contributing, yet at the same time not impose too much pressure.

Adult students have a self-concept of being in control of themselves. They are accustomed to taking charge of their affairs and taking responsibility for meeting their obligations.

In teleconference instruction this means the instructor should not be overanxious about keeping control. It means also that the activities of teaching can be shared. This opens possibilities for a greater variety of activity than can be accomplished by teacher alone, and variety is crucial in this medium.

For most adults continued education is an activity undertaken in spare time that they hope to have benefit from in the short term. They are usually impatient about learning for the sake of learning, and at least want to know that what they are asked to learn fits into their larger purposes in work or personal or community life. For this reason projects and case studies in which they can apply knowledge to back-home situations are specially appreciated. Projects give students opportunity to apply their knowledge, and can also be used to evaluate learning. Because project learning is usually quickly transferable it is also highly motivating.

Because learning is a spare-time activity for most adults they appreciate a learning environment that is enjoyable. In particular this means a friendly supportive atmosphere marked by opportunity to socialise with other learners. It has been a consistent phenomenon that after initial shock at being apart from the instructor, students report pleasure at the interdependence they develop in teleconferencing as a result of the instructor's distance.

Finally, adult learners being persons of experience are more likely than children to appreciate the relative and problematic nature of knowledge. The adult more often recognizes that education frequently deals with uncertainties, with exploration, with controversies and disagreements. Teleconference allows for more "brainstorming" and exploration of knowledge than do recorded media, and students appreciate opportunity to explore different perspectives and a wide range of opinions as course content.

So, taking these considerations into account, the implications for practice of teleconferencing are:

Try to maximize student participation;
maximize the opportunity for student involvement in planning the learning program;
maximize student presentation;
maximize interaction;
focus on learners problems as basis for curriculum;
maximize self and peer evaluation;
make the learning experience relaxed and enjoyable.

Instructors by teleconference can aim to be less structured than in distance teaching by print or recorded media. They can be less structured than in conventional lecture based courses, and be close to the open dialogues of the small adult learning group.

In a typical course it is possible for the instructor to plan and provide an outline of events and topics for the teleconference "meetings" and to plan in general terms what subject will be covered in each particular segment of the course, in what way, and by which resources, i.e. by student groups or individuals, or visitors. The instructor may give an overview of a topic, a history, and bibliographic references, and should then try to be artistic, and to go with the flow of communications that are presented, aiming to maximize and influence the flow of dialogue among students.

The instructor might chose to organize sub-sets of learners to work on projects and case studies. Students can discuss personal interests with team members, decide which to focus on as group activity, plan to divide responsibility for making presentations, and for researching literature resources. Team members share in reviewing set readings and presenting analysis, and report to the class by bulletin board, or realtime conference. Besides project teams it should be possible to adapt other adult teaching techniques, such as panels and debates.

It helps a great deal if the student groups aren't too large, and more important that they meet in teleconference often enough for the instructor to build a sense of

trust and risk-taking. It is also reasonable to bring in experts to give the students the satisfaction of hearing the latest ideas and information from recognized authorities, and instructors also offer their expertise. This has its content dimensions but is just as often that of expert conductor of the communication and learning process.

What experience has shown is that teleconference makes distance teaching very exciting. It is possible to be both more dialogic and less structured, more exploratory and speculative than in print, correspondence or recorded media. It is possible for students to have greater autonomy and to share in the responsibilities of deciding what to learn and to act as significant resources for each others' learning.

14. Policy.

Federal, state and local policies with regard to distance education have only begun to emerge in the past decade. Policy research has consisted mainly of studies and recommendations to planners, aimed at the development of procedures for coordination and regulation, with consistent concerns being: accreditation and regulation of credit programs delivered by distance education, especially out-of-state delivery; funding of such delivery; enhancement of resource sharing among, and cooperation among institutions; reporting and accountability issues; and, in a few cases, faculty development. Among specific questions that are engaging the attention of persons in the policy areas are: the role of the states and non-governmental agencies and federal agencies in overseeing the development of distance education; the responsibility for leadership in what ought to be large scale, and therefore multi-institutional, multi-regional, sometimes global program development and delivery ; the analysis of future directions for distance education, based on the visions held by policy makers across government and key distance education organizations; more specifically, to what degree to they want distance education to be an alternative to conventional education; to what extent to incorporate and to what extent to be incorporated into conventional education?

The main weakness of distance education in U.S.A. is its fragmented nature. Not only are institutions separate from each other, there is even division within institutions. Most programs are fixed on only one type of medium. It is important not to be myopic with regard to the technological wonders of any particular communications element of distance education. We should look beyond the question of HOW TO USE particular communications media, and apply ourselves to questions of philosophy, social policy, educational theory, history, learning theory and the support of learners, instruction, evaluation and research. These are the givens of the educational universe. Diverse communication media come, and some go. They all change. Computer communications should play as important a role in distance education as in other aspects of modern life, such as the civil aviation system or the army; however the airline is as much the low tech and the human interface as it is the satellite and the computer. Similarly the army. These are total systems; integrated total systems; with technology and people; with mission and vision as well as technique. So is, or ought to be distance education. Being aimed at meeting the needs and rights of all sections of our society for high quality education on equal terms for all, and being aimed at meeting the needs and rights of the total population for lifelong learning without disadvantage caused by age, place of residence or other barrier, distance education is not only a total delivery system, it is a movement and a method that is far more important than is any particular technology.

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An Introduction to Computer Conferencing: A Look At Software Available In The Academic World

by
Alex Cruz

This paper is intended to be an introduction to some of the concepts of computer conferencing as well as a guide to some of the existing conferencing software today. Even though the number of commercial users is increasing, the software described is mainly used in academic environments. It should provide novice users with the necessary concepts and leads to visualize the applications of computer conferencing in their fields. An special emphasis is placed on interactive computer conferencing.

What is Computer Conferencing?

The concept of computer conferencing is not new and lot of definitions have been given. It refers to the idea of establishing some type of communication with one or more people through a computer that is presumably connected to a network of other computers. The most basic way of computer conferencing can be two computers connected to each other through a wire.

The sophistication of computer conferencing is directly related to the amount of 'wire' used, the friendliness of the software used, the geographic location of the parties involved, the requirements of the information to be transmitted (simple documents, graphic files, etc) and the nature of the conference:

Types of Computer Conferencing

Computer conferencing can be classified in many different ways but mainly two different variables define the types of computer conferencing best: the size of the audience and the amount of time involved in the question-response interval .

According to the first variable, size of the audience, there are three different types of computer conferencing:

One-to-one: one person interacts in a direct way with another.

One-to-many: one person establishes communications with more than one person at a time.

Many-to-many: many people are able to interact with many others.

According the second variable, amount of time, there are two types of conferencing:

Non-interactive: the period of time between the initial contact and the response can vary from a few seconds to many weeks.

Interactive: the conference occurs "live"; participants are able to communicate to each other directly at a particular time resulting in no delay between the initial contact and the response.

Most people involved in the academic and research fields have already experimented with some combinations of these different types of computer conferencing: the most basic and oldest way of computer conferencing is the one-to-one, non -interactive kind: electronic mail.

Using the concept of electronic mail, mailing lists were born: the same message body was to be sent to many people; this refers to the one-to-many, non-interactive conferencing. Thousands of private and public mailing lists exist today over hundreds of computer networks; this is not surprising since most computer systems that have electronic mail soft ware allow distribution lists that can have many electronic mail addresses.

The last type of non-interactive conferencing refers to the many-to-many concept: any person belonging to a large group of users can "post" a message or article and many people can reply to that message, each of the replies being able to be read by all the users. Thousands of electronic bulletin board systems utilize this idea for discussions of different topics.

The massive use of interactive computer conferencing is more recent and its applications are starting to flourish as the academic community increases its involvement with such systems. One-to-one software is very common and included in most multi-user operating system packages such as Unix, VMS, CMS. Even one-to-one interactive computer conferencing can be broken down in two different types:

Line driven: in line driven environments, one user sends a single short message to another user's address in the system.

Screen driven: two users establish a communication session where typically, the screen is divided in two halves, and each other can "talk" by simply typing the desired text. The other party receives the text as it is being typed or after the return key has been depressed, depending on the hardware/software being used.

One-to-many interactive computer conferencing attracts the idea of 'public speech' or 'lecturing' in aacomputer environment. Even though this concept has yet not been fully explored, it would naturally be included as part of many-to-many interactive because of software limitations: most many-to-many conferencing software have or can implement the one-to-many feature (for example, as a listen-only user).

Perhaps one of the most exciting types of conferencing nowadays is many-to-many interactive communications via a computer. Thanks to the already existing commercial and academic computer networks, many people have been introduced to the concept of across-the-world interactive communications. Some examples will be provided later in this paper.

This type of software allows a user to interact with many users at the same time and discuss different types of issues and exchange research and academic problems and solutions . Due to the cultural and geographical diversity of the users of some of these systems, many different types of useful feedback is provided when asked for.

How is computer conferencing used at the university level today?

Non-interactive computer conferencing has been used extensively at just about every college and university. Most higher education institutions have a connection to BITNET and/or the Internet. The main applications of these connections are electronic mail, file transferring and remote login. Both BITNET and Internet connected computers have bulletin board style software available: BITNET list servers and USENET newsgroups are the main ones; USENET is indeed a network of its own that sits on top of many other Internet based networks.

Academically, teachers are using electronic mail and mailing lists to get in touch with their students on class matters and university administrators to provide faculty and students with information related to university life and courses. Intelligent 'fuzzy' electronic mailers [IRCC APRIL90] combined with other conferencing services such as interest groups lists or newsgroups help both teachers and students get answers and suggestions to their subjects of research as well as find answers to questions that have already been asked. Today, it is common for a well 'networked' researcher to search for the answer to a problem first by asking others in a specific topic discussion group and then apply the results to the problem if a feasible answer is found. These and other applications reveal an extensive use of non-interactive computer conferencing in academics.

On the other hand, interactive computer conferencing is starting to become more and more popular at the university level: BITNET users are able to contact any user in the BITNET network by using a simple command to issue line messages. The power of Unix software/ hardware along with the already existing Internet based networks allow academic users to establish one-to-one screen based communication sessions by also issuing a simple command. At the moment, limited academic research is being conducted on the applications of interactive computer conferencing to teaching and researching, though it is being widely used for electronic meetings among researchers to discuss aspects of the research as well as to collaborate in projects remotely.

Software Examples For Each Category

(The following is a small guide providing some examples of software and hardware that is able to execute the different types of computer conferencing as previously described.)

Non-interactive computer conferencing is already widely in use but the outreach of a single computer connection (BITNET or Internet based) is not well known yet:

One-to-one: electronic mail. The number of companies, institutions and foreign countries that now are reachable through already existing computer networks has increased enormously in the last few years. Companies and computer services such as Compuserve, MCI (MCIMail), AT&T (AT&T Mail), GEnie, the National Public Telecomputing Network, Applelink, Byte Information Exchange, Connect Professional Information Network, Fidonet, GeoNet Mailbox Systems, NASAMail, PeaceNet, the Space Physics Analysis Network, Telenet's commercial electronic mail service and many regional networks are all already connected to the Internet or other networks reachable from the Internet and therefore can reached by BITNET [INMG90]. For a guide on how to reach each network from your system, get the Inter-Network Mail Guide by John Chew, by anonymously FTPing into ra.msstate.edu (see Appendix A) and obtaining the file: /pub/docs/internetwork.

For a more complete description of all the possible networks that can be reach, refer to "! % @:: A Directory of Electronic Mail Addressing and Networks" by Donnalyn Frey and Rick Adams, O'Reilly & Associates, Inc.

One-to-many. this type of computer conferencing normally comes as mailing lists or moderated newsgroups. If you wish to get introduced to the concepts of list servers, send a one line message to LISTSERV@BITNIC.BITNET with the content: "HELP". Only an e-mail connection is needed to subscribe to most discussion lists.

Many-to-many. USENET moderated and unmoderated newsgroups are more common on Unix and Internet connected machines. Subjects of the newsgroups range in both intellectual as well as recreational value. There is a very strong molecular biology community that uses the USENET software and network to exchange ideas and discuss research. Just about any type of computer software and hardware has its own newsgroup as well as some other science topics. On the recreational side, sport event schedules from soccer to biking are regularly posted; also TV, music, humor, religion and foreign cultures have their newsgroups. If you do not have access to a USENET news feed, please contact your system administrator.

Interactive conferencing is easily reachable at the one-to one level because the simplicity of the software is not comparable to that of many-to-many conferencing software. Also, it must be noticed that the type of software described here can only be found in large multi-user systems: local area networked personal computers normally already have software that enables some computer conferencing.

One-to-one:

* Unix (Hewlett Packard, MIPS, DEC, AT&T, Sun, Next manufacture hardware for the Unix Operating System):

Most versions of the Unix operating system support the "talk" command which enables the user to establish an initial user to user session where everything that one user types appears in the screen of the other user and vice-versa until an escape key sequence is pressed. A typical command line could look like:

talk amiller
to talk to user amiller in the presently used system,
or talk amiller @ magnus .acs .ohio-state.edu
if the Unix system being used is other than

magnus.acs.etc. Adding other users to the initial one-to-one conversation is not possible.

In addition to the "talk" command, most Unix systems also support the "finger" command which allows a user to get a list of users at a remote machine:

finger @mercwio.dm.unirml.it

will return a list of current users in a Sun workstation used in the department of Mathematics at the University of Rome, Italy. these two commands compliment each other when a user is trying to find a particular remote user and talk to him/ her.

• VMS (Digital Equipment Corporation Vax machines...):

The PHONE command behaves in a very similar way to the 'talk' command in UNIX. The PHONE command does allow for more than one user at a time.

• CMS (BITNET based machines, IBM main frames..):

The TELL command in this operating system allows lows the user to send a single short message to another user currently logged on to any BITNET computer:

tell CRUZ at OHSTVMB Hello, Alex how are you?

tell CRUZ at OHSTVMB Hello, Alex how are you?

would send a short message to user CRUZ in BITNET node OHSTMVB.

All three commands in all three operating systems are standard. Contact your local system administrator if not present in your machine.

Many-to-many: (Due to the diversity of interactive computer conferencing, only three systems will be touched and given sources to)

• Bitnet Relay Chat: this software is available mainly for BITNET based machines. It provides the user with a friendly interface to communicate with other BITNET users. Some of the features of this software include: switching between users/screens via PF-keys, disk message logging, disconnected answering machine services; it is suitable for any type of terminal from 1200 Baud PC to local 3270 terminals. It is maintained by Eric Thomas (ERIC @ FRECPI 1 .BITNET) [CHAT90]

• Internet Relay Chat: It is mainly a Unix based program that enables machines from all over the world connected to both Internet and BITNET based computers to establish a "chat" connection and set one-to-one, one-to-many and many-to-many sessions. It provides many different features such as private, moderated, invite-only, secret channels, group and private messaging, multiple nicknames, notification of user presence, user list by server, channel and other properties, etc. To access IRC on a trial basis from an Internet connected computer, type "telnet bradenville . andrew .cmu.edu" and provide the necessary nick- name and screen emulation information. Issue the command "/HELP" to get started, "/WHO *" to see the current users (as an average 200+ from over 18 countries around the world) or '/LIST' to see a list of current users.

The software to run IRC is free of charge but copyright guidelines are to be met. This is where it can obtained:

OS	Site	Directory/File
Unix	freebie.engin.umich.edu	pub/irc/clients/UNIX
VMS	freebie.engin.umich.edu	pub/irc/clients/VMS
VM	freebie.engin.umich.edu	pub/irc/clients/VM

OS = Operating System; Site = Site to FTP to (see appendix A);

Directory/File = Filename and directory

International Citizen's Band: this is a similar program to IRC. It contains most of the same features but its architecture and logic for server-client connections differs from that of IRC's. The software can be obtained through anonymous FTP at "athos.rutgers.edu, file/pub/icb-client.tar.z". This software will only execute in Unix based machines.

Conclusion

Computer Conferencing is another necessary tool for today's computer aided research and instruction. It has all the embedded advantages that other already used electronic media enjoy: easiness of processing, easy data storage, quick detailed responses, easier to find the desired recipient, speed and reliability of document/message transmission, document safety and security, etc. [CRUZ90].

There are also other advantages that are due to the character of this type of communications: the store-and-forward nature of computer conferencing gives the participants a response time period that is not possible in more traditional ways of face-to-face or telephone communications [STEVENS86] .

Flexibility so that any researcher with a workstation and a network connection is able to join a discussion session; facility to search the network for existing conferences; multiple communication channels; these and other features are needed for collaboration during the process of refining a theory or analysis of experimental data [SMARR90]. Interactive computer conferencing already offers these features.

Computer conferencing is a growing field and many applications are already surfacing in the areas of project coordination, sales management, customer service, online market places, interactive journalism, distributed education and organization & community building.

The academic world is just a step away from fully taking advantage of all the capabilities of computer conferencing.

Appendix A

The TCP/IP file transfer protocol is called File Transfer Protocol (FTP). FTP enables a user of a given network to remote access and then locally transfer files existing in another computer host of that same network. Many computer hosts allow for anonymous FTP, whereby a user can obtain files from a remote host [QUARTERMAN88].

The FTP software is available in most Unix and VMS based systems. Some IBM mainframes support FTP file transferring but with a lot of limitations. In order to access the software, just type "ftp host.name" where host name is the archive you want to access: "ftp ra.msstate. edu" 'will access the machine "ra" at the Mississippi State University archives. When prompted for a USERNAME: respond with the word "anonymous" and when prompted for a password respond

with your electronic mail address. Once the connection is successfully established, the user may retrieve any of the files available in the authorized directories. To retrieve the InterNetwork Mail Guide, the user would type:

cd pub (to change to "public" directory)

cd docs (to change to "documents" directory)
get internetwork

(to get file transmitted from the remote computer to the current directory of the user that is doing the FTP connection)

Exiting the program can be resolved by typing "exit" or "quit" at the FTP prompt.

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Delivering Credit Courses by Computer And Other Observations

by
Donald R. McNeil

Three or four years ago I stepped into a taxicab here at the Columbus, Ohio airport and was amused to see a whole panoply of technological devices mounted under the dashboard. There was the usual radio voice squawking out orders to drivers around the city, and a radar detector for protective purposes. There was a cellular phone and along side it a television screen connected to a small computer. The driver could punch in questions to find out the fastest and easiest route from one place to another, what the costs would be, and how much gas would be used to reach the destination. If bored, he could switch it to television.

I marveled at this magnificent array of gadgetry and for several months afterward told the story as if this, plus my experiences, heralded a new age of technology, as if this symbolized the all pervasive penetration of technology everywhere in our society.

I should have known better. I had spent six years as head of University of Wisconsin Extension, with its radio and television divisions, its Articulated Instructional Media (AIM) Program and a Kenya radio-study Project. I had spent four years managing a consortium called the University of Mid-America (UMA) which was designed to take video courses to colleges and universities throughout the country. Out of that UMA experience had grown the idea of an American Open University with computer conferencing as the centerpiece for enabling students at a distance to obtain a baccalaureate degree. We initiated the program at New York Institute of Technology.

More recently, with financing from the Fund for the Improvement of Postsecondary Education, we have been conducting an experiment at Montgomery Community College in Rockville, Maryland in which we are comparing academic outcomes, levels of satisfaction and cost effectiveness of using computer conferencing and E-Mail as a means of totally replacing the classroom and as a supplement for video courses offered by the College.

In short, for the last 25 years or so I have been involved in the APPLICATION of technologies in educational settings, and whatever lessons I thought I could draw from those experiences and that cab ride in Columbus, I was far too impulsive about my conclusions. Or maybe it was naivete. The world was not moving as fast toward the proper application of technologies as I once thought.

I pause here to offer a few general comments about what I feel is the present state of technology. The computer is rapidly being wedded to voice and video. The videodisc, the compact disc, graphics, easier-to-use software all will help create a learning environment in the future that will be vastly different than what we know. And computer conferencing should be looked at in light of that whole new and rapidly changing technological environment.

In a sense technology IS almost everywhere. But widespread utilization is not. Nor do we know very much about the outcomes of these prodigious efforts to introduce technologies into every phase of our lives.

This is particularly true of education whether it be at the elementary and secondary or college and university levels, or whether it be training programs for industry, labor or government.

It is true that more and more people are becoming involved with the computer as a tool in the learning process, but the computer's penetration of the work force and the schools and colleges is still very shallow. A number of notable experiments are under way and they are to be lauded. And while we have a long way to go to gain universal acceptance and usage we are definitely moving ahead.

However, it still seems to be a provider-oriented market, that the "magic answer" mentality of hardware and software vendors is matched only by the "gee whiz" attitude of some administrators, purchasing agents, computer center personnel, legislators, faculty and students.

More attention to assessment of the consumers' needs — both faculty members and students — is in order. Is this the right method for this course? Which of the several technologies will work best. Do we need in every case such sophisticated software? What are the rewards for faculty members who participate? Will there be resources sufficient to make it a quality course?

No doubt, people everywhere are beginning to have enormous expectations of technology. They believe that information and technology linkages will bring them into the mainstream (a place where few people feel they are), that they will receive great economic detail. Three years ago the Academy for Educational Development, a not for-profit consulting and management organization, received a grant from the Fund for Improvement of Postsecondary Education (FIPSE) to explore the possibilities of using computer conferencing as a means of instruction. The idea was to compare computer conferencing instruction with traditional instruction by using the same instructors teaching the same courses by two different methods. The students would come to the campus only for examinations. The study was later modified to include comparison of traditional courses with video-based courses, too.

Our three-year study demonstrated two things: First it exposed some of the basic problems of introducing and maintaining the computer as an interactive instruc-

tional tool; and second, it confirmed the long-range potentialities of inter-active computer instruction.

While these two general conclusions might sound a bit contradictory, the fact remains that we are far from convincing the masses of faculty and students of the effectiveness of inter active computer communications, even as our vision of the immense possibilities of the method is re-enforced by studies such as this one.

The original design of our FIPSE grant called for a semester of planning and training, four semesters of teaching, and a semester for evaluation and completion of the report. Originally, we were to teach two courses per semester. When we modified the system by including support for TV-based courses, we taught as many as 10 courses per semester. The two instructors who taught the first semester repeated their courses the second semester. In the last two semesters, when TV courses were supplemented by E-Mail, eight more faculty members participated.

About 100 students participated in the E-Mail sections from the time the courses were first offered through this past Spring semester. Fifty-seven percent were female and 43% male. Seventy-eight percent were white, 10% were black, and 12% were "other" (meaning Asian, Hispanic, etc.) Ages ranged from 19 to 84. The median age was 30, the mean, 32 , with a surprising number of persons in their 60's and 70's participating. That raised the question among us senior citizens as to the validity of the old maxim, "You can't teach an old dog new tricks."

It is important to note here that even after the grant money was no longer available for instruction — when we were in the evaluation stage of the grant — the system continued as a regular part of the Montgomery College course offerings during the Spring semester. In fact, about 20 students have signed up for the E-Mail version for a basic programming computer course this summer. Moreover, five courses offered totally by E-Mail are scheduled for this fall. Time and experience may be the crucial factors in success.

The experience of using E-Mail as a supplement to the TV courses which were normally offered, brought forth some complaints. Learning and using E-Mail was extra work for faculty without extra pay or time off. In the main, however, faculty members who used it extensively found it helpful.

Our evaluations took several forms. We used questionnaires for both comparison groups at the beginning of each semester, and then different questionnaires for faculty and for students at the end of the course. Besides periodic planning and evaluation sessions, each of us — the campus coordinator, the technical support person, and the project director — wrote a summary evaluation at the end of each of the first two years of the project. Our final report is now in the process of being written.

In addition, we had an outside independent evaluator beginning the second semester and now have a different outside evaluator looking at the total project.

So here are some of the preliminary findings with personal comments of mine as to the implications of the findings and some suggestions for others who might be entertaining the thought of utilizing this exciting means of instruction.

First the good news:

Students using interactive electronic communications did as well as those students who took the same course in the traditional lecture method. In some cases, E-Mail students did better but that may have been because of the nature of the students who used E-Mail who were generally highly motivated by the opportunity to overcome time and place handicaps.

Second, E-Mail instruction met the academic objectives of the courses. In fact a sizable number of faculty said they felt that the objectives had been more than met.

One really interesting side-light to this conclusion, was the statement of one professor who had taught the course entirely by E-Mail and traditionally. She said that while her traditional students absorbed more information from the course, the E-Mail students thought more critically about the subject matter. This might call for further study.

Some faculty members noted that their own writing skills as well as that of the students improved, that they wrote more precisely than before. One professor noted that it was not the computer that was the variable in writing ability, it was the practice that came from the very nature of teaching with E-Mail.

Third, student satisfaction with E-Mail was high. They liked the quick feedback, the opportunity to "talk" with their fellow students; indeed, they actually helped each other. A majority said they spent ;more time on the E-Mail course than they did in regular courses. They also cited committed faculty, good technical support (after an initial period of chaos and disgust), and the asynchronous nature of E-Mail which let them work on the course at their convenience. They liked the reduced travel time and costs and not having the hassle and costs of parking.

They also mentioned the support of the college administration which loaned them modems and especially the marvelous support of the technical backup (again, after a period when the support system was in disarray).

Another interesting side light: Faculty members felt they spent more time than on a traditional course the FIRST time they taught the course, using E-Mail, but less the second time around. This poses the hypothesis that as they become more at ease with the computer, they may even be able to teach more students which makes the operation more cost effective from the institution's stand point.

The downside findings and conclusions are good warnings for others contemplating the use of instructional E-Mail. The responses varied a great deal and seldom, with one exception, were they unanimous.

That unanimous opinion was on the subject of lack of technical support and the mid-semester breakdown of the software system during the first year of teaching. It almost became a disaster. We had to change from a computer conferencing to an E Mail system in mid-semester. The old system was unpredictable. The experts could not answer technical questions. Some students began getting technical phobia. The breakdown also called for us to tailor the new E-Mail package to our needs, install the software and teach faculty and students how to use the new system. But while we lost a few students, many of them remained and finished the

courses. We also hired our own support person at that point.

Success will depend to a great extent on the role of the college's computer center and its backup capabilities, how it supports faculty and students, how well it knows the system, and how patient it is with people who are just learning how to operate a computer for the first time. When we found such a person to act solely as our technical backup person, the system began to run smoothly with few complaints from faculty or students.

Some students and faculty missed the face-to-face relationship. Both faculty and students felt there should be a longer training period. Faculty members felt they needed training in how to teach with this media, to be exposed to teaching strategies that would work.

As for cost effectiveness, it was difficult to get reliable information. We do know that start up costs are heavy, but costs per student per course are alleviated the longer the system is in operation. For example, the College bought and loaned 25 modems for students and faculty and six computers for faculty members. The College will be using them over and over with new faculty teaching by E-Mail and students who take their courses.

We have some anecdotal information about costs: the young man who worked nights clerking at a hotel who could not have taken the course without E-Mail, the woman who was pregnant and could not always get to campus at the prescribed time for classes, the remarks of several who mentioned the relief of not having to drive 20 or 30 miles to class.

In a sense, this becomes "cost avoidance," a slightly more complicated result than plain "cost effectiveness."

Offsetting this "cost effectiveness" is the argument that in order to train people for the "information society" we must encourage computer literacy and effectiveness as part of the mission of higher education. The cash outlays may be high at the beginning, but just as it has in the administrative areas, the computer (combined with video in some cases) will be an important factor in the instructional process in the future.

Moreover, in the long run, widespread use will bring to institutions a different form of cost avoidance, namely, the costs of new buildings — even new campuses. Provided of course that the program becomes large enough. But for the long haul, technology can be cheaper than real estate and buildings.

Out of these facts and opinions, then, I come to several overall conclusions and recommendations. I am convinced that E Mail or computer conferencing is a valid and important means of conducting distance learning programs. It has immense possibilities, especially as we avoid or resolve some of the problems which we, as early birds in the game, suffered through.

There are five major concerns which any potential user ought to concentrate on.

First, the planning process. We did not take enough time to plan the details of the operation. This included such things as the role of the computer center, the adequacy of the software, the need for modems and hardware, how to recruit faculty and students, what time and support the faculty members needed prior to teaching via this method, which constituencies were we after, which courses should be taught? Eventually, we solved all these problems but too often it was midst a crisis.

Second, training. We did not spend enough time training our faculty and students. With neophytes to the computer world especially, one needs to conduct a training session, let the people go away and practice and then come back for further training. And then repeat the process as often as needed.

Incidentally, one of the wrong assumptions we are likely to make is that only those with a great deal of computer experience will take these courses. While 80% of one class said they had used a computer previously, only 17% said they had taken a course in computer science. And only 10% had ever used a modem before.

Third, marketing. We learned after the first semester that marketing an innovative product like E-Mail had to mean more than putting a notice in the campus newspaper and the class schedule. We began to target audiences — computer clubs, single parent groups, physically disabled organizations, local weekly newspaper readers, employees of corporations. We had thought that Montgomery County with a high per capita income, a number of hi tech companies, and headquarters for several national organizations would be ready for credit courses conducted by computer.

We were caught between those who had, and knew about, computers but did not need the courses we were offering because they were highly educated, and those who needed our courses and did not have access or knowledge of computers. (We offered access to computers at the college but that meant the students had to come to campus which the program was designed to avoid.)

Fourth, finance. Fortunately the campus had money to invest in lap tops for the faculty (on a loan basis) and modems for both faculty and students. But up front costs are reasonably heavy and that fact should be built into the planning process.

Fifth, leadership. This not only means strong administrative backing from the top administration. It means recruiting prestigious faculty which will put a psychological stamp of approval on the innovation. It means a particular kind of leadership from the computer people who provide the backup. They have to be patient and able to explain complex ideas simply.

So where does that leave us. It leaves me with the feeling that despite the problems we had and despite the limited number of both students and faculty we attracted to the program, that ultimately more and more educators and trainers will adapt this method of instruction and training for their benefit.

To go back to what I said earlier. It is not a contradiction to say that we experienced a number of problems but still came out with the feeling that computer conferencing in some form is part of our educational future.

The Fully Electronic University
or
Mind Expansion Without Drugs

by
Edward B. Yarrish

(This paper has been adapted from a verbal presentation that included slides and audience involvement that cannot be duplicated in a written form. Participants from the Conference will recognize that changes had to be made for a different medium in the same way that education will change with the new medium of computer conferencing.)

How My Mind Was Expanded

Computer conferencing technology affects our sense of thespace/time continuum.

I never really understood the idea of space/time as a continuum until I did some mental exercises created by Jean Houston and distributed on an audio tape titled, 'Mind Expansion Without Drugs'. I borrowed that title for my presentation because it was a description of what I and others had experienced in our use of computer conferencing systems.

The Jean Houston exercise asks, after you have relaxed and cleared your mind, to visualize a different image for a series of increments of time. It uses both very small and very large units of time. For example, see if you can create an image in your mind for —

— a minute
— a second
— a tenth of a second
— one hundredth of a second
— a thousandth of a second
— a millionth of a second

Now let's go the other direction. What is your image for—

— a day
— a week
— a month
— a year
— 10 years
— 100 years
— 1000 years
— 10,000 years

Well, when I did that, the images I saw in my mind's eye were
small for small time units, like the distance a second hand moves for a second, and large for large units of time, like a view of the earth from out in space for 10,000 years.

I learned that small units of time were small spaces and large units of time were large spaces. There was a continuum that joined time and space.

Of course, we use the concept of this continuum all the time.

For example, when someone asks how far is it from Allentown PA to Columbus OH, I might answer, 'Oh, about 9 hours driving time.'

The question was in terms of distance. How far? A spatial measure. The answer was given in units of time — 9 hours.

I might have answered, 'Two hours flying time.' The technology of my choosing affects my sense of space time.

The world is a lot smaller because of the airplane.

Well, computer conferencing has similarly adjusted my understanding of time and space. Communicating with a friend in Japan is the same experience as communicating with a friend in New York. I don't feel the distance.

Computer conferencing has made my world smaller and more intimate.

Can We Open Our Minds to New Opportunities and Challenges?

A friend recently sent me a card with a note that said, 'minds, like parachutes, must be open to work'.

Well, I am here to provide the hot air to fill your parachute.

In fact, I want to start way up in the clouds of blue sky ideas and slowly descend to earth. You'll need your parachute open to travel slowly and gently downward to more grounded concepts.

We'll start with the dreams, the leap of faith out the plane door and finally get to the farmers planting seeds of innovation in the fresh soil of opportunity.

Dreams sound a little crazy when you describe them to others, because only you see them so clearly. But, dreams and dreamers are necessary. If you don't believe me, ask the folks in the sleep deprivation labs about how necessary dreams are to our health.

But dreams can seem crazy to others who don't share your vision. The last time I was here at OSU was on Columbus day to help get the Global Dialogue Association started for North America. The GDA is still more dream than reality. Like Columbus' dream of sailing west to go east. Now that was a crazy idea.

Could you imagine yourself living in 1491 when Columbus started to promote his idea? Everyone knew the world was flat. Your grandfather knew it, and told you mother, and your mother told you. It was the 'truth'. Everyone knew it.

You might imagine that Columbus didn't have an easy time getting supporters, but he certainly made history.

Now today, five hundred years later in 1991, here comes some dreamer talking about a 'fully electronic university' and he wants you to climb through the looking glass of the computer screen and sail on his computer conferencing spaceship into new electronic universes. Sure! Right!

You know that universities are buildings and campuses and classrooms. They have always been that way and they always will be. Right?

Well, I don't claim to be a new Columbus, but I do want to share some of my personal exploration in electronic space, and I want to tell you about some of what I learned on those journeys.

What Does a "Fully Electronic University" Mean?

Let's take the words one by one —

FULLY — Where the university is inside the computer.

Smaller, less visible, less physical than today's university— more mental.

Like Alice going "Through the Looking Glass", we leap throughthe computer screen into a magical world completely of human creation.

Into a world as small as a subatomic particle and as limitless as the universe.

ELECTRONIC — not bricks and mortar.

Electronic space where we can create new models of our world and play 'what if' with them to explore possible future times.

Where we can create new learning tools and new learnings.

Where not only the results are captured, but the step-by-step process of how we got there, so we can learn more about the dynamics of processes and move beyond the flat, and static, two dimensional limits of paper thinking.

Where time is recorded and we can replay past events.

A UNIVERSITY — a community for learning, not limited by space, not limited by place.

A FULLY ELECTRONIC UNIVERSITY — A place to instantly publish and share knowledge.

An electronic, global distribution system for carefully crafted instructional modules and for instant insights of wonder.

We Need New Mental Images of a University

Dare we expand our minds to take the image of the university from the neatly trimmed, ivy covered halls, the pristine, ivory tower to the whole planet with all its problems and chaos?

Can we do it without drugs to easy the pain? The pain of letting go of the familiar so we are free to move into the unknown.

Can we stand the freedom of having our choices expanded, ourvalues challenged, or will the disturbance of new thoughts,new ideas only create disturbed minds that know no peace orresolution?

Will the disturbance be that of the grain of sand in the oyster that produces the pearl of wisdom? Or, the blow that shatters the mind that has such calcified rigidity that it allows no uncertainty? Perhaps, as in most changes, it will be a combination plus many unanticipated results.

All that is perhaps a warning — the type of changes we are talking about are dramatic and possibly disruptive. If the level of discontent indicated in the popular media is accurate, education is poised for changes as dramatic and disruptive as those that have impacted Eastern Europe. And, computer conferencing technology is ready to provide new option and opportunities.

Computer Conferencing a First Step

Computer conferencing, as it exists today, is the first step toward the fully electronic university. To become a beneficial development for our planet it requires —

1. Leadership,
2. Creativity, and
3. Concern for, and about, people.

By being at a conference like this one, you are already demonstrating your willingness to show leadership. You also will learn about the creativity that has been made a part of computer conferencing over the last 15 years. All of us by working together can demonstrate that this new medium can improve the human condition. We are moving into new, pristine, electronic space. Hopefully, we can bring the best of our human experience into this new universe and leave the worst behind.

What Is Computer Conferencing?

Computer conferencing is different from electronic mail and bulletin boards. It includes elements of each of these, but also much more. Current software has three major elements —

— messaging
— meetings
— management

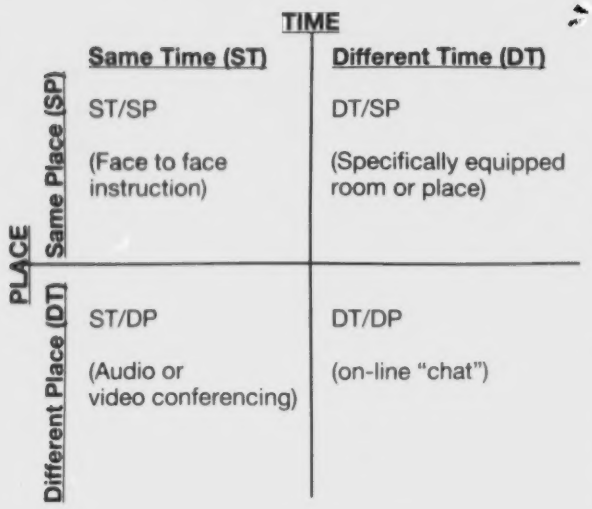
Messaging is similar to electronic mail in that it is a private communication, usually limited to a sender and receiver. Meetings are group interactions that can be similar to classrooms, seminars or hallway conversations.

Management is what turns conferencing into an organized and intentional educational process.

Conferencing is part of a larger spectrum of computer mediated communications processes. The following chart was developed by Christine Bullen from MIT and Bob Johansen from the Institute for the Future. The technologies that represent the 4 quadrants of the chart will eventually blend to help create the fully electronic university.

This chart shows the 'space/time continuum' of computer mediated communications. Our focus, computer conferencing, assumes that the people can learn together even if they are doing it at different times and different places (DT/DP).

Related technologies are available for the three other variations of time and place.



A New Vocabulary Needs To Be Created

We have had to create some special names to describe the mental effects of computer conferencing on our sense of time.

Susanna Opper, who was the first president of Electronic Networking Association, coined the term, 'rolling present', to describe what happens when you get an inbox of messages waiting for you.

You experience a series of conversations on different topics where others you are communicating with may have made their comments over a span of days or weeks. For you it is the present as it rolls up your monitor. All the energy, passion, laughter is real for you right then. You respond accordingly with messages of enthusiasm, anger or humor.

You are emotionally engrossed in what to the others has already passed down the stream of time.

Computer conferencing has expanded my mind by introducing other new vocabulary to me.

When a new medium of communication is created, new roles forthe people who work in that medium are defined. For example, when motion pictures came into being new roles like producer, director, key grip and best boy entered our vocabulary.

Computer conferencing has given us roles like sysop, porter, moderator and netweaver.

A sysop is usually someone who runs the computer system and is more technically oriented.

A porter moves information and messages among different systems and usually combines good technical skills with a sense of what will interest people and is therefore worth the effort to port.

A moderator creates discussions and is responsible for keeping them of value to the participants. This person needs good group process skills and an interest in ideas and people.

A netweaver is somewhat like a producer for the movies. He weaves all the elements and people together that are needed to make a successful system. A combination of organizational skill and creativity is a key requirement for this role.

In 1985 I decided I was going to be a netweaver. After years of training to learn this new and still little known craft, I put that title on my business card for the first time in 1990.

The Electronic Networking Association, which I helped to found in 1985 and for which I currently serve as treasurer, has an electronic newsletter called the Netweaver. In fact there is even a book published in 1984 titled, "The Netweaver's Sourcebook", that captures a sense of the diverse skills and knowledge that this new role requires.

Now you can tell your friends that you went to Columbus, Ohio and met a netweaver. And, they probably will ask what is a fisherman doing that far away from the ocean. I would just love to hear the explanation you give them <smile>.

[Writer's Note: The <smile> above is a common way to illustrate the body language that is missing in online communications. I do it so naturally after years of online conversations that it even slips into other written forms of communications. Like this one <grin>.]

Expanding My Mind As An Instructor

In addition to my role as a netweaver, I have also had the role of moderator/instructor online. To play that role I had to first be willing to become a student of this new medium and open my mind to new processes and challenges.

The computer conferencing software I work with is called PARTICIPATE. This name was chosen to indicate a major requirement of this new medium — you need learners to participate, passive attendance isn't enough.

In fact, users of this medium have created the term 'lurker' for those who read but don't contribute to an onlin discussion. This term creates a certain social pressure to contribute.

I have come to recognize that we have been trained socially to do just the opposite most of the time. The overwhelming majority of us are expected to be a passive audience, just listening and watching. Whether in front of the television, the stage or the podium, our role is to be passive. Very few of us get the opportunity to express our thoughts and feelings in front of groups.

To reenforce this system, a higher social value is given to being the speaker than to being in the audience. In computer conferencing a high value is given to the person who can get others to speak and participate. This means that the instructor/moderator's "question to statement ratio" must be much higher than in a traditional classroom.

*[Writer's Note: Another one of those online habits is adding emphasis by using symbols like the * around words or phrases.]*

The titles moderator and participant are much more appropriate in this medium than instructor and student. Using these titles is a good way to help people adjust to the differing behaviors and expectations of working online.

Online communication is very much a conversation even though it appears on a screen as text. People will often reply, "I heard you say", not "I read what you wrote". But, this is a conversation without the usual visual observations of the person and the information we get from those observations.

The absence of the visual clues is one of this medium's great opportunities.

I have found it has been an opportunity to get to know people in ways that I would not have in face-to-face interactions.

A key example of this is working online with people who have some physical handicap.

In a face-to-face encounter, the person with a handicap always has that difference impact the interaction. Online the handicap is not apparent. He, or she, neither gets sympathy nor avoidance based solely on a physical shell.

The interaction can go past the shell because the shell doesn't exist online.

This same benefit can help me as an instructor overcome my preconceived ideas about people based on age, skin color, body shape and mode of dress. I can interact with them based on their energy and ideas and not be limited by my prejudices.

Let me give you a brief summary of several other adjustments I have had to make.

— Text items online need to be brief, not long speeches or articles. Books or photo copies are still better for long items than computer screens.

— I had to plan parallel activities and discussions because the pacing online is slower than a classroom. The medium makes having parallel streams of activities very easy, but that is very different from the sequential thinking needed for class after class, week after week.

— The names given to the electronic spaces set aside for those activities and discussions need to be chosen carefully because they give clues about expected behaviors. An area titled 'coffee break' is going to signal different behaviors from one named 'lecture hall'.

— The socialization processes that take place in the halls and cafeterias of a physical university have to be allowed and encouraged in the electronic university.

Some of these can take place online, others can still be done best face-to-face. I'll let you have the fun of figuring out which ones are which <smile>.

Economics Considerations Will Assist Us

Economics will be one of the forces that help support the move toward the fully electronic university. Here are economic reason for society to support this movement.

1. Computers, and electronics in general, are one of the few areas of the world economy that continue to provide significant productivity gains. Each year the power, speed and capacity of computers increases as the price remains the same or decreases. Contrast this with the cost of higher education that continues to increase each year with little change in the product.

Increased investment in computer capabilities for knowledge workers holds a productivity improvement promise that is similar to what the investment in machinery has meant to manufacturing. Whereas knowledge workers used to see an investment of about $1500 per worker for desk, chair, filing cabinet, phone, etc., manufacturing had an investment level in the range of $30,000 per worker.

Today, I would estimate that progressive organizations are investing more like $5000 to $10,000 per knowledge worker.

Computer mediated learning can tap the promise of these trends to bring productivity gains to education at exactly the time that education is being challenged by society to make significant improvements.

2. The electronic university can be more cost effective than the bricks and mortar one.

Accessing the electronic classroom via modem means that it can be used 24 hours a day, 7 days a week, 365 days a year. Setting up a new electronic classroom can be done in a few minutes with software commands. It can even be done by the faculty member who directly creates his or her preferred design. Contrast that with constructing a new physical classroom.

I also would argue that much of the western world has too many buildings already. Most of our cities show a serious lack of maintenance. Indicating to me that, as a society, we have more buildings than we can manage properly, yet we have people who are homeless.

Most knowledge workers use two physical spaces today. One to live in and one to work in. When one is filled the other tends to be empty. If by using more electronic space knowledge workers could use only 1 and 1/2 physical spaces, we could reduce the number of buildings we have to maintain and also free up space for those who don't have any, like the homeless.

A few years ago I decided to practice what I am preaching here. I had two buildings, one home and one office building. When one was filled the other was empty. I had to be concerned about the security of each when it was empty. I don't really enjoy building maintenance, yet I had to be responsible for it in two buildings.

Today I have one building and am working on the addition that will give me 1 and 1/2. My office is fully electronic in that I meet and work with my associates inside of a computer conferencing system.

Unfortunately, I still haven't improved in my building maintenance activities, but I am working on it <smile>.

3. A fully electronic university can open new markets and generate new revenues for education.

The potential market for a new course of study can be millions. But, as soon as you select a specific day of the week for a class, you significantly reduce the potential market because of schedule conflicts. As soon as you choose a location, you further reduce the potential market because of the cost of getting to your chosen location.

Because an electronic course is not limited by time, you don't reduce your potential market by picking a day of the week. Because traveling the data highways can be less costly and more convenient than traveling the thruways, you don't have the market reduction caused by picking a physical location.

All this means that people who want the course but couldn't come to the physical university may be able to attend the electronic one. These people represent markets that aren't being served today, but can be tomorrow's new sources of revenue.

Similarly, the courses that aren't offered today, because there are too few people who might find them of

interest within the geographic limits that the university presently serves, might be justifiable when the geographic limit can be expanded to an entire country, or even several countries.

Finding the faculty to teach a course can be affected by those same geographic limits. Today a faculty member in the Soviet Union can teach a course to students in the USA. And, that is already being done.

4. The electronic university is ecologically more sensitive, and there is increasing economic justification for ecologically sensitive alternatives.

A fully electronic university can reduce the need for driving and the resulting air pollution. It doesn't need parking lots and the associated water runoff problems. It can greatly reduce the amount of paper needed to convey information and, therefore, reduce the amount of trash and preserve more forests lands.

Seeds of Innovation

Computer conferencing makes the truly global university possible. Students, faculty and administrators can all be at various places on the globe. Each living, working and studying at a place of their choosing, based on quality of life, intellectual stimulation, cost of living or whatever other factors they feel are most important. The folks at Connected Education, Inc. provide a masters degree program today that works very much that way.

Having a global university provides some interesting challenges for human social adaptation. One of the challenges will be adapting how people are named.

A computer conferencing system let's each person be referenced by their name. The PARTICIPATE software that I work with has a theoretical capacity of more than 4 billion names. The challenge is that the names must be "unique". Two Bill Smith's or three Tom Miller's aren't allowed. Since each human being is unique, perhaps this is a move in the right direction to recognize that fact.

This situation brings to mind what happened in our human history as we moved out of small villages and into cities. That was when surnames were created and many people who did the work of a blacksmith or milled grain, became known as Smith and Miller.

Luckily our common consciousness is preparing the way. The social trend over the last 10 or 20 years that has caused many couples to combine surnames in some form versus using only the male name is the equivalent of adding another surname. It gives us the added uniqueness needed for that huge global white pages of the future.

Since that problem is being addressed, we may need to think about a more important one — do we have the necessary world class instructional products — the courses and related materials?

Based on popular media reporting, I get the impression that our educational system produces a product of a quality similar to that little East German car that sounded like a pebble rolling around inside a tin can.

Can our educational product face global competition? Can it be —

— So effective in its presentation that everyone understands?

— So comprehensive in its coverage that nothing of importance is left out?

— So flexible it automatically adjusts for all types of learning styles?

— So attentive to quality control that there aren't any rejects and that every learner coming out of the system is graded "A" in quality?

A similar challenge has been placed in front of businesses today that are competing on a global basis. Education is going to be held to the same standards as computers and other electronic technologies provide for instant global distribution of educational products.

Can we do all that while lowering the cost every year?

The answer is that we can and that the rewards will make it worth the effort. The rewards will be in the quality of life we live and in new degrees of freedom. There is a great market around the globe today for freedom. And higher degrees of freedom in time and space can help improve our quality of life.

If we nurture these seeds of innovation and dream together, years in the future we can harvest grains of wisdom to nourish us and flowers of beauty to give us peace.

Finally, let me share with you a poem that a friend, Harry Stevens, wrote. I have renamed it —

THE NETWEAVER'S CREED

I'd rather be a node in a network,
Than a cog in the gear of a machine.
A node is involved with things to resolve,
While a cog must mesh with cogs in between.

A cog in a niche can never question
An instruction from a superior.
It does what it's told and seldom acts bold,
Except when bossing an inferior.

A node's a crossing of lines of action,
And in the center there is inner peace,
Where choices are born and memories form
Mutual respect makes tyranny cease.

Teaching by Computer Conferencing

by
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Introduction:

This paper addresses issues in teaching online, especially how to design and implement an online educational environment on a computer conferencing system. Experiences in educational computer conferencing at two universities illustrate how this communication technology can be transformed into an educational environment through the application of intentional design. The focus is on the use of computer conferencing to support and augment active collaborative or group learning, that is, how to turn a conference into a classroom or seminar room or campus.

Background:

Computer conferencing is a recent technology, developed in 1971 . Over the past two decades it has been adopted for group communication by many sectors of society. The following timeline outlines the adoption of computer conferencing, giving particular attention to educational use and selected educational applications (see Notes).

1971-2	CC invented. The first application was for Government Use
mid 1970s	CC adopted for Corporate Communication
mid 1970s	CC adopted for Science & Research Networking
mid 1970s	CC adopted in Universities
late 1970s	CC used in Public Online Services (The Source)
1982	CC first used for Education (WBSI Executive Training)
1984	CC & Teacher Networking project at OISE
1984	CC used by AmericanOpen University for distance education
1985	CC used for course delivery at NJIT, OISE, ConnectEd
1985	CC used for teacher networking at SFU
1989	CC used by Open University (UK) for first mass d.e. application
1991	CC adopted by many schools, universities, colleges.

Educational adoption of computer conferencing began less than ten years ago but its adoption at all levels of education, from public schools to universities, teaching colleges, graduate schools, and distance and adult education demonstrates the strong interest in the new teaching and learning options that it offers. Experience indicates that with some reformulation, the group learning approach is particularly appropriate to computer conferencing and can generate important educational outcomes (Harasim, 1990; Hiltz, 1990; Newman, 1990; Riel, 1990). Online groupwork may be used in relatively small classes (10-30 students) or—with some modifications—for hundreds or even thousands of learners. This article considers issues in designing and implementing online group learning, based on experiences in classes of 6 to 70 students.

Computer conferencing has been used at the Ontario Institute for Studies in Education (the Graduate School of Education for the University of Toronto) since 1985, and at Simon Fraser University, Canada, since 1986 for a variety of educational applications, including:

- Credit course delivery (entirely or partially online)
  - -graduate level
  - -undergraduate
- Curriculum enhancement (in regular face-to-face or distance courses)
- Teacher Networking and Peer Support
- International Educational Research Workshop (Online)
- Latin American Educational Research Network
- Inservice Training and Support
- Teacher Professional Development
- School-based Networks

-SFU Learning Xchange

-Southern Interior Telecommunications Proje

-Wired Writers

-TeleLink

-Ask an Expert (in law, the environment, etc.)

-SFU Xchange provides links to

-KidsNet (National Geographic)

-AT&T Learning Networks

-Edutel.(on Comserve), etc.

-OISE Bilingual School Network

These varied online educational activities have had important educational benefits. Teachers and learners have found that computer conferencing can enhance cognitive and socio-affective interaction, it is not overly difficult to learn, and the system offers features that can positively change the way in which learners can learn and teachers can teach. For example, participation by students can be very active—far beyond what is possible in face-to-face classes. In courses delivered entirely or partially online, students averaged 5 to 10 messages each per week (Harasim, 1991). A rich database of 1,000's of messages about various curricular topics with multiple perspectives was generated in a class with 20 students. And this content rich database was produced by all the students, with the message input being fairly evenly distributed (Harasim, 1987). Students also reported finding it easy or easier to become friends and colleagues online than in traditional classroom settings. Students appreciated the increased opportunity to communicate with their colleagues and with the instructor, and felt that the 24 hour/7 day/week access improved the quality of their learning and knowledge building.

Instructors who use computer conferencing do so because they feel that online education provides learning opportunities and outcomes superior in important ways to those available in traditional classes. Teachers report a sense of rejuvenation, both as a result of the satisfaction in the learning opportunities afforded the students and also as a result of the opportunity to network with other teachers (Teles, 1991).

Research in other settings indicates similar results, demonstrating that learning outcomes for courses delivered by computer conferencing can be at least as good as outcomes for traditional face-to-face courses, and that it offers new unprecedented benefits (Hiltz, 1990).

HOWEVER, critical factors for success depend upon:

- adequate user access to equipment
- student characteristics (students motivated to work online, who are self-disciplined and have access to computers, are likely to produce superior outcomes).
- the instructor's effort and skill in teaching online.

This paper focuses on the skills and effort of the educator in teaching online. Computer conferencing offers tools to augment teaching and learning opportunities; it cannot compensate for inadequate instructional design and input. The remaining sections of the paper examine issues in conceptualizing, designing, and managing computer conferencing for educational purposes.

Teaching Online:

Teaching online involves both conceptual and mechanical tasks. Educators adopting computer conferencing for teaching and academic collaboration need skill in the following key areas:

I. Conceptualizing Online Education
II. Designing Educational Activity Online
III. Managing the Online Environment
IV. Operating the Basic Mechanics of Computer Conferencing.

I. Conceptualizing Online Education: Opportunities and Constraints

Teaching online requires understanding the nature of the medium in order to conceptualize and design it as an educational environment. In earlier works I have argued that online education is a new and unique domain: while it is similar in important ways to face-to-face education and also to distance mode education, the attributes of computer conferencing combine to offer both unprecedented opportunities and constraints for teaching and learning (Harasim, 1989; 1990). The characteristics of computer conferencing shape the way in which educational tasks, timelines, and group processes can be implemented. Educators need to formulate the instructional events based on the attributes offered by computer conferencing.

Five attributes of computer conferencing distinguish this communication system and provide a conceptual framework to guide teaching online (Harasim, 1990). They are:

* many-to-many
* place-independent
* asynchronous
* text-based
* computer-mediated communication.

These attributes enable new teaching and learning options; they also introduce unique constraints for designing and managing the online educational environment.

II. Designing Online Education:

Education is based on intervention by a content and/or process expert (the instructor) who organizes the content and sequencing of the instructional activities. While attention to design of the activities is one of the singlemost critical factors in successful online education, the instructional design of online environments is a new area. Unlike face-to-face teaching, online teachers do not even have the benefit of their own experiences as learners to serve as models. Conceptual models, such as that of collaborative learning, together with experiences from the field provide valuable teacher guides for teachers on the use of educational computer conferencing.

Computer conferences are "spaces" that require shaping, structuring, and topical sequencing to form an environment. Computer conferencing is a tool developed to enable distributed group communication. Shaping the features of the conferencing system into an environment for educational interaction requires significant input by the teacher. Just as with face-to-face education, online education requires structuring the learning events according to task, groups, and timelines. However, the opportunities and constraints of the computer conferencing medium are quite different, in important ways, from face to-face communication.

Turning a Conference into a Classroom

Significant intervention is involved in making a computer conference feel and function like a classroom, in turning a computer screen into a 'window on the world', and making a series of asynchronous messages 'feel'

and behave like teamwork. Students who in the class may be relative strangers and never meet in face-to-face conditions, must be able to function as a group using only computer messages. The conferencing system and instructional design must be organized to facilitate that. What is astonishing is that students can and do adapt very quickly, if given appropriate conditions. The instructor's challenge is to create those conditions, to set up an environment for group learning using such limited tools as the ability to open and close conferences in various topical and temporal formats and to create a sense of group and community, among electronically assembled individuals by assigning access privileges and membership in the various conferences.

To illustrate, computer conferencing—like face-to-face activities—supports group communication exchange. However, in order that seminars, discussions, debates, and group projects function online, they require reconceptualization to fit within the attributes and constraints of the computer conferencing environment. Online group communication can take place 24 hours a day, 7 days a week. It is also place-independent. These qualities increase access and expand opportunities for discussion, interaction, and reflection. Increased access (temporal and geographical) and the motivation of the group communication environment can stimulate very active input by learners. Designs for online group work are needed to structure and organize the student input. Text-based discussion can be voluminous and soon overwhelm even an enthusiastic reader, so message organization and focus are important for managing the information flows and the curriculum. Managing group tasks among team members located in different cities or perhaps even countries is however complex, especially by text-based communication.

Metaphors

Metaphors such as a campus, a schoolhouse or a classroom can provide the entree or link to help new users become comfortable with the online space and be able to conceptualize and navigate around the various conferences. Using the example of the online campus, the teacher may compare each conference to a room, with each room forming the setting for a specific activity or topical discussion. One conference may be designated as a seminar room for a particular topic; another conference may be a room for small group discussion; yet another conference could be designated as an electronic cafe, for informal socializing and drop in; a "help" space is a conference for requesting or volunteering assistance. Each "room" is a conference. Users move from room to room by changing conferences. The metaphor helps users grasp the conferencing 'environment'. By knowing where to send comments or where to go to read discussions, users can feel comfortable and become productive much sooner.

Intentional Design

Intentional structuring of computer conferences—such as in the definition of individual, paired and small group tasks, and the definition of sub-group and whole-group discussion—can create an educational environment to organize the online educational activities. Designing an online educational environment involves structuring conferences by

- type of task
- size of group
- duration of task
- scheduling of task.

Conference spaces can be distinguished according to the type of task. Two types of conferences are needed: 1) conferences for course related activities and 2) conferences for informal discussions such as an 'electronic cafe' and 'help'. The informal, social spaces are essential to building online community and supporting the socio-affective aspects of knowledge building.

Conference 'type' is further distinguished by access privileges, that is, who is able to read and/or write to that space. In a typical online class conference, the teacher will allow all users the privilege to read and write messages. However, certain conferences may be designated for small work groups, and access to such spaces would be limited to the members of the group. Other kinds of conference may also be set by the teacher to enable certain students to read and write messages, while allowing other students to only read messages (for example, see a dyad debate). An online class activity may have students working in small groups or dyads to conduct an assignment and prepare a report for the full group. The groups need 'work spaces' where they can discuss and draft out their final report; only the members of the group and the teacher would have access to this conference space. For the purpose of the class 'presentation', the teacher would then open a conference to which all class members are joined.

Conferences may also be distinguished by group size. Some topics or tasks may require a full group or plenary group activity, while others may benefit from small groups or dyads. (A discussion of different kinds of groups and group sizes follows on the next page.)

Duration is related to the length of time a conference is open or made available by the teachers for a particular topic or task. Writing a report may involve a small group up to 3 or more weeks, while other tasks, such as a small group discussion, may take only one week. Activities/conference such as the 'online cafe', the library, or 'help' should be open the entire period of the online course.

Scheduling of tasks and conference spaces is important for sequencing the learning and organizing the curriculum. Online courses at OISE and SFU used a schedule based on the unit of an 'online week', based on a full seven days (including weekends). Some tasks, such as discussion may utilize one unit or online week per topic. Tasks which involve more extensive work may require several online weeks.

Structuring and sequencing of the online activities can be accomplished by providing several conference spaces to accommodate different tasks and topics for various durations. Topical and temporal structuring of conferences assists information management, organizing the messages by topic and by sequence. Providing a conference per topic, and specifying the duration of

each topical discussion/conference (such as a weekly topic or focus) can help to organize the temporal and topical sequencing of the curriculum. Structuring and scheduling conferences helps to organize the activities conceptually and procedurally for the participants.

Online Learning Groups:

Here is a brief description of selected group learning activities that have been found effective online:

1. Plenary seminars
2. Small group discussions
3. Learning partnerships, dyads
4. Small working groups
5. Team presentations/moderating by the learners
6. Simulations or Role Plays
7. Debating teams
8. Peer learning groups
9. Informal spaces for socializing, such as an online cafe
10. Mutual help
11. Access to additional educational resources (References, InterNet, ComServe, Library, Groliers encyclopedia, Eric, Etc.)

1. Seminars:

An online seminar has many similarities to a face-to-face seminar. Students prepare by reading the assigned materials and then log on to discuss, debate, extrapolate upon, and critique key issues and defend their positions. Students log on to the appropriate conference to type in comments and to read and respond to input from their peers and instructor. The medium of discussion is text-based. Time is more malleable online than in face-to-face: an online seminar is open 24 hours a day, seven days a week. Asynchronous discussion increases the opportunities for participation and reflection; everyone can comment and have the opportunity to reflect and build on previous comments. This new rhythm of interaction—in which response is not real-time but delayed—can also contribute to 'communication anxiety' (Feenberg, 1987).

2. Small group discussions

Small group discussions involve groups of 3 to 10 individuals who focus on a particular topic usually under the guidance of a group leader or the instructor. As with the face-to-face variety, an online small group discussion often follows a plenary presentation or seminar discussion, or it may complement a parallel online or face-to-face activity.

Small group discussions are particularly valuable for facilitating active discussion in a large-sized class or when there are special interest groups on a particular topic. As in a seminar, students prepare for the discussion by reading the preparatory material or undertaking a related task, and then logging on to enter comments and respond to comments already in the conference.

3. Learning partnerships, dyads

In a learning partnership or dyad, learners are grouped into pairs to provide peer support or to undertake a task. Dyads can be used, for example, early in an online class to serve as an ice-breaker, providing a peer in what is otherwise a new environment. Dyads are useful as well for a first assignment, such as a joint writing project. Working in pairs is logistically easier than working in larger sized groups online and can provide a valuable entree to small work groups. The dyad may have a conference as a work space or, particularly in the case of peer support, partners may use the email facility when they need or wish to communicate. Having a conference space for work provides a record of the discussions and what has been produced; it also enables the teacher to participate and comment if necessary.

4. Small working groups

Small working groups enable students to collaborate on an assigned task, such as undertaking a research project, producing a report, or solving a problem. Teamwork online is possible even where members of the team live in different locations and are linked only by computer conferencing. Effective online teamwork requires clearly defined tasks, roles, labor distribution, and timelines. Either the students or the teacher need to establish principles for decision making, timelines, and distribution of labor. Coordination is critical when timelines are involved and the work is interdependent. To facilitate the process, the teacher might assign the task, group roles, subtasks, and timelines, or any portion of the process. At minimum, suggesting a timeline for the various phases of the online project can be helpful. Coordinating group work is a complex but crucial aspect of collaboration online.

Group size is another important factor for groups working to generate a common product. Groups of three to four students are, in most cases, a manageable size. Too many participants may result in unwieldy decision-making processes. This is particularly critical in an asynchronous environment, where decision-making can be stalled if users log on irregularly or are unable to reach consensus.

Online group work can reflect different kinds of products and processes. It can mean that the final product is a composite of each member's input; or it can be the result of collective input, refinement, and completion.

One of the benefits of the online environment for group work is that the final report or product can be 'presented' to the class. The working group needs a private space during the preparation of the final report, and a public conference open to all class members where the final paper can be presented. Allowing class members to read and ask questions or comment on each 'presentation' contributes to expanding the learning of all participants on that topic.

5. Team presentations/moderating by the learners

Research on group learning indicates that the most effective learning comes from teaching others. Students in online classes can take on roles typically associated with teaching such as leading class discussions. Team presentations may involve writing and then posting (presenting) a report or paper, online, to a computer conference, where it is read by peers and the instructor for comment. This is typically part of a dyad

or small group project. Or it may involve leading a topical discussion. One example involves having students work in teams of 2-4 persons to present, moderate, and synthesize a seminar on a class topic. The task involves three components: a) preparing and presenting an introduction to the topic, based upon assigned and additional readings (day 1 of the online week); b) moderating the week's online discussion (day 1-7) c) synthesizing the content and analyzing the usage statistics and group process (this is posted 3 days after the seminar).

6. Simulations or Role Plays

Simulations or role plays enable learners to apply their theoretical knowledge in a simulated environment. This technique is enjoyed by learners of all ages. The online environment is particularly conducive for simulations and role plays, given the potential for anonymity or pseudonyms and setting out hypothetical scenarios. Examples of role plays used successfully in online environments include an online 'management lab', in which students take on various roles in managing a hypothetical corporation; an 'evaluation manor', in which learners assume the personas/perspectives o~ various evaluators to debate evaluation approaches and procedures; and 'Sam's Cafe', in which learners adopt the personas of characters in a bar to explore different philosophical perspectives and positions.

The instructor assigns the roles and establishes the task and the timelines. The outcome may be a product, such as a report or it may be a process, such as an opportunity to deepen and pursue a discussion. Timelines might be short, such as a few days or the role play may continue over an extended period, perhaps alongside other tasks. In some circumstances, such as in training contexts, synchronous communication may be employed, whereby a team enacts a particular scenario such as a budget crisis or an interview.

7. Debating teams

Debating teams allow learners an opportunity to deepen their analytical and communication skills by formulating their ideas and information to defend one position and critique the counter position. An online debate can be unstructured, in which students respond to a stated position (and defend their position), or it can be structured, as in a dyad format in which participants are assigned a particular position on a topic. Each dyad team is given a conference space to present, argue and defend their case. Other dyads may be allowed to read the debates of their peers, but they can write only to their own space.

One of the unique features of online activities is the full transcript of the proceedings that is automatically generated during the class discussion. This feature can be utilized for retrospective analysis or review, thus helping to develop critical and analytical thinking skills. For example, having the rules of the debate require that students gather their data and arguments from the class conferences encourages students to make multiple passes through the transcripts. This approach is thus particularly valuable as a concluding activity, whereby students revisit and review and rework the content of the class.

8. Peer Learning Groups

Peer learning groups can be based on dyads or small groups, where learners assist one another on various tasks (writing assignments, problem-solving, etc.) For example, students may work together online to help one another improve their writing skills. Each student prepares a draft version of a paper which is sent, online, to a peer for comments and critiques. Based on the suggestions and input of the peer, the student revises the paper before submitting it to the teacher. Both the paper and the peer critique can be graded. In other cases assistance may be encouraged for mutual support networking.

If the task is conducted using dyads, the teacher has the choice of opening a conference for the activity or having students use email. The conference option is preferred where there is a need for a record of the interactions and/or for the teacher to easily participate.

9. Informal socializing: the online cafe.

Social communication is an essential component of educational activity and an online educational environment should provide a space for informal discourse, such as online cafe. The online cafe can contribute to creating a sense of community, within the group, forging a social bond that can offer important motivational and cognitive benefits to the learning activities.

The online cafe should be primarily a student space, and not directly tied to the curriculum. Grades should not be assigned for participation in the online cafe. This is a space for students to talk about their interests, concerns, the weather, social plans, or even write an interactive group short story. The main point is that it should be primarily a space developed for and by the students, for socializing .

10. Mutual assist for help

An online help conference based on mutual assistance is a valuable tool for providing technical and system support. The mutual assist conference is where students can ask for help about using the system, or share tips on how to use it better. As a mutual help space, it also encourages cooperation and social learning. The opportunity for students to share their discoveries in operating the system also builds confidence in using new communication and knowledge work tools.

11. Access to additional educational resources

(References, InterNet, ComServe, Library, Groliers encyclopedia, Eric, etc).

Most university computer conferencing systems enable access to other online resources such as international networks (Internet & Bitnet enable academic email and user group services such as Comserve); as well as access to online databases, the library catalogues, and similar information pools. These resources could be integrated into the design of online activities to benefit the curriculum .

III. Managing the Online Environment

Getting Started:

Many questions arise as teachers begin to plan an online class activity or online course. The thought of

getting started, and getting the students online and active may provoke some anxiety. While having a conceptualization of an online environment and various group activities is useful, actually launching the online work may seem complex. Many questions can arise. What kind of training do students require? Does a teacher ease slowly into group work or implement it quickly full-scale. How to handle initial student uncertainty about group work? online? How to ease into this situation?

In university or adult level activities where students are not co-located, and where travel to a training site is difficult or impossible, training may be handled online. Good manuals and some basic, easy to read 1-page sheets illustrating a typical logon session, are adequate. Additional online or telephone help should be available if needed. A face-to-face training may be offered if users live nearby. While face-to-face training need not be required, hands-on training does offer an opportunity to build confidence in computer conferencing and a sense of community among the class members. Seating students 2-3 at a terminal is useful to initiating group work and group problem-solving. Hands on activities should introduce basic operations of computer conferencing and involve group tasks.

For example, in launching online class activities I generally allow for about 4-6 hours for training activities. Training should include an introduction to the course, the curriculum, the collaborative learning approach that is used, and something about the use of computer conferencing for teaching and learning. Once students have been introduced to the concepts of online learning, they could move to hands-on activities. In my online courses I have already set up the introductory email and conferencing activities so that this 'environment' awaits students. The first task is to log on, read the email message that is waiting in their inbox. That message is from me, personally welcoming them to the online class and asking about their first impressions of online communication. Students must then respond to the message: their response both enables me to ensure that they have learned how to read and send a message as well as to see their immediate feelings about computer conferencing.

Having completed the task of reading and writing an email message, students go on to send and receive computer conferencing messages. The first conferencing activities that students experience in my courses are full-group and are based on something that they already know about. Since students are confronted with 'new learning' to master the conferencing system, the subject matter should be familiar at the outset, beginning with the known and then moving to the unknown, i.e., the curriculum. I begin with three conferences, all of which are plenary or full-group:

- Self-introductions
- Our objectives (for the course)
- Great Debate.

The first two conference topics are self-evident. The third, Great Debate, deserves description because it has been so useful, and because it is quite different from the formal debate described earlier (section 7). While the debating teams are more formally organized, as an activity that would occur towards the end of an online class activity to incorporate the class transcripts, the Great Debate intends to initiate the students to online discussion and debate. My goal in the Great Debate is to engage the students as soon and as much as possible, to make them feel that their computer screen has turned into a window on the world. I have found the Great Debate to be very valuable in this respect. In the Great Debate I formulate a statement related to the topic of the course that is very controversial, and likely to generate strong and different positions. I ask students to formulate their position and to defend it. Once students post their initial comments they become eager for responses to their comment, and to read comments by others. Their curiosity and interest sets the tone for active engagement and students begin to log on regularly. Soon after, within a few days of debating and self-intros, the class moves into group activities on the curriculum.

Role of the Teacher:

The role of the teacher changes in the online environment in several important ways. Compared to face-to-face teaching, for example, a class taught entirely online requires extensive planning. In this respect it is similar to distance mode activity because the teacher or moderator must send all course materials to students in advance of the course. On the other hand, the interactive nature of online education provides a flexibility that in many ways resembles face-to-face classes. New information, perspectives, or changes to the course design can be easily introduced and accommodated online, to enhance or modify the existing curriculum by incorporating references to current events or including new information.

Delivery of education through computer communication alters the relationship of the instructor, the students, and the course content. Unlike traditional classroom activity in which it is the teacher who directs the instruction, leads the lessons, prompts responses, and paces the class, online group learning is student-centered and requires a different role for the teacher. Computer conferencing enables a shared body of text: students can build knowledge, interactively through text-based messaging related to the course content. The online teacher becomes a facilitator rather than lecturer. The teacher plans the activities; in online groupwork the curriculum is student-centered. The many-to many, asynchronous nature of the medium democratizes access and encourages student input.

Rather than direct a lesson, the teacher needs to provide the group structures to enable students to work out a problem or undertake a task, search for strategies on their own, and evaluate their solutions. Though the teacher needs to be present, the conferencing system enables the teacher to play an observant but background role and put the primary focus in the class on the students' own thinking processes.

Forming Groups:

As mentioned earlier, the size and composition of the groups will vary online. Some activities may be done by

dyads and others by small groups or the entire class as a plenary session. Groups or teams may work together for different periods of time, ranging from perhaps a week to a full semester. The teacher must initiate the formation of the groups. Group formation may be accomplished by the teacher or by the students or both methods may be used. While there is merit in allowing students to sometimes choose their own group, self-selection is complex online. Conferencing systems do not yet provide tools to facilitate group formation, and the asynchronous nature of the medium can create problems for the student trying to organize her or his own group by email messages, especially if there is a deadline to the groupwork and a limit to the size of group. A student may not know whether a group is full and loose time trying to establish contact with someone in the group. Or a potential partner may have already agreed to another dyad and then not log on for some time. Assigning students to groups can avoid these kinds of management frustrations, particularly in conditions where groups do not meet face-to-face, and/or when deadlines must be met.

Groups may be organized according to various principles, such as common interest or friendship, or by principles of heterogeneity such as ability, race, gender, perspective, or other variables.

Assigning Role Responsibilities:

The teacher must decide whether to assign group roles and responsibilities. Assigning or encouraging group roles may be advised in the online context, given the logistical difficulties that can occur. Assigned roles also assists students to anticipate and prepare for the tasks ahead. One role that is particularly valuable is the coordinator, to track task completion and ensure that the work is proceeding smoothly and in a timely manner. Another role is that of the editor whose responsibility is receive the various pieces of online work written by group members, edit them into a cohesive whole, and upload the report to a specified conference space. Actual task activity needs to be distributed among the various members, acknowledging the additional load on the coordinator and the editor.

If roles are assigned, it is valuable for the teacher to provide opportunities for students to experience different roles, learning leadership skills as well as technical skills.

Moderating & facilitating group processes

Once groups begin to work, the role of the teacher is to observe, facilitate and provide information as appropriate. The nature of conferencing systems is particularly conducive to a facilitative role by teachers, in which they may read and monitor the discussions in the various group conferences looking for opportunities to offer academic and social learning.

Online group learning is a golden opportunity to see what students have learned and how they understand and apply the concepts. While in traditional classes students have little opportunity to participate, in online group activities students must participate and articulate their ideas. If ideas are incorrect or the students have misinterpreted the information, the teacher has an opportunity to clarify. Monitoring group activity should be unobtrusive so as not to undermine the group dynamics nor the process of discovery and learning. Students may take on this role themselves. However, if help is needed or it an incorrect idea is not challenged, this is a valuable opportunity to help students understand the information or the tasks.

'NET'iquette

The term 'netiquette' refers to the etiquette of network communication and social interaction. Working online is a new experience and users can benefit from a set of guidelines or "NETiquette" to provide orientation in how to work with the conferencing process. The class netiquette should state the expectations and rules for participation in the conferencing system. For educational activity, netiquette could be provided for: 1) writing online and 2) group dynamics online.

Netiquette & Online Writing:

Since all discussions, debates, and interactions in a computer conferencing system are text-based, guidelines to help the communication flows are important. Suggestions include:

a. Message keyword: users should begin each message with a keyword, to act as an advance organizer for the message content. If responding to a previous note, WHICH note should be specified so that the reader can refer back if needed (ie, in response to Pat's note #14 about apples). Keywords help to create organizational order and conceptual links.
b. Message length: Each message should have a maximum limit. For class discussion, 1-2 screens per note seems to be a good length.
c. Message focus: A message should contain one point, plus examples. This rule of thumb makes subsequent references clearer and easier to track.
d. Visual layout: Messages should be presented so be easy to read. For example, double spacing and/or using only upper case is difficult to read. Including paragraph breaks is helpful to visual layout.
e. Message tone and typos: Online discussions may be viewed as "talking with one's fingers" rather than formal writing. Messages sent to online discussions need not be inhibited by concern for formatting, typos, even formal grammar.. As long as messages are 'readable', it is the flow of ideas that should be important. However, assignments presented online should be well written, corrected, and formatted.

NETiquette and Group dynamics:

Group dynamics addresses how to build and maintain a sense of online community. Positive climate building can reduce anxiety about communicating online, and contribute to a positive collegial environment. Climate building can be developed by:
in using the computer is not a prerequisite, the user must be able to manage the operating environment of the microcomputer in order to access and move around the conferencing system.

The mechanics of Online Education involve skill in basic operations such as knowing how to -access, and up/download messages in CC and email -read, write,

a. use of first names by participants
b. responding promptly to messages
c. use of reinforcement phrases (ie, "Good idea!" or "Thanks for the suggestions", etc.)
d. use of personalizing remarks (ie, a reference to where you are working—home, office, terminal, what is happening around you, the weather, etc.)
e. avoiding hostile or curt comments. No objection able, sexist, or racist language should be tolerated.
f. displaying humor
g. promoting cooperation by offering assistance and support to other participants and by sharing ideas.

Beyond NETiquette: Do's and Don'ts

a. Demonstrating courtesy online is fundamental. Moreover, many sysops are providing advance warning regarding the use of any form of libelous or abusive comments, which would result in the loss of the user's account
b. To build community in this new and somewhat foreign environment, user accounts with real names can be important. Pseudonyms and/or anonymity—if—employed, should be restricted to specific tasks.
c. Confidentiality: Nonparticipants should not be given access to any of the conferences (either viewing onscreen or in print), without the previous consent of all participants and conferees.
d. Copyright & Plagiarism: The words or text of others should not be cited without proper acknowledgement of the source (if this was in some public source), or—if private (as in a conference) without their permission.

Problems

Teachers constantly face various kinds of problems and given the newness of the medium, online teachers may face more rather than fewer difficulties. Here are some of the more common problems that arise and some suggestions on how to deal with them.

In the OISE and the SFU experiences, the difficulty most reported is technical problems. Technical problems are most common in the early days of the online activity and tend to almost disappear over time. The most common problems relate to setting up the modem/communication system, learning how to access the conferencing system from home or work, getting lost in the conferencing system, editing online, and uploading and downloading difficulties. As an online teacher, an approach that I have found helpful is to tell students at the outset they should set up their equipment, and gain some familiarity with it before the class starts. It is advisable that if students are purchasing new equipment such as modems & communication software, that they look for easy to use modem/software and buy equipment that is supported by technical staff at the school or university or buy from a reputable dealer who will provide them service as needed.

The online "assist" conference is helpful in encouraging group support, with students requesting help from and providing help to one another rather than relying on the teacher to provide the answers. Assist is heavily used, primarily early in the online class (with experience, students have less need of assist). I also provide customized user documentation, and on occasion, will provide online tutorials on specific problems if there is a clear group need. However, generally with some help from one another and from me, users are able to gain comfort on the system in 4-6 hours and confidence and some mastery within 8 12 hours of use.

A second major problem lies with group work online. The asynchronous nature of the communication medium can pose difficulties for group work. Problem solving and decision-making require particular attention in an asynchronous environment, especially when deadlines are involved. Coordinating the tasks in a work group online is very important. Designs for group activities can address and compensate for such constraints by providing explicit guidance for accomplishing the tasks and for managing the group process. Providing explicit timelines for the various subtasks is helpful.

Information management is another problem experienced online. Computer conferencing enables very active participation and active conferences generate a rich database of information. However, high levels of activity can be a double edged sword if there are no tools to help manage the information flows.

Conference structures are valuable but they are not enough to deal with information overload. Students and teachers report that information overload is a significant problem. Some causes of the feeling of overload can be dealt with: these occur early in the course as students learn to navigate around the system and the sense of being lost can trigger an experience of overload. Related to this, students may send notes to the wrong conference, and this creates confusion for others who are reading the conference. Also student enthusiasm is often high in the early weeks of online activity, with some students writing voluminous and numerous messages. However, with some experience online, students refine their 'online learning' skills, and these problems are overcome. Nonetheless, the larger problem of overload that accompanies an active online class remains to be solved. New developments in the area of information management tools hold some promise.

Finally, many students and teachers report that the amount of time spent in online classes far exceeds that of traditional face-to-face classes. Teachers need to ensure that the workload for students is manageable. Teachers also need to attend to their own workload online. Given the tremendous accessibility of online class activity, and the increased availability of the online teacher, students may begin to expect almost 'instant' response to any question they pose to the teacher. To help set student expectations, teachers may consider posting 'electronic office hours'. For example, university instructors or adult trainers might post office hours (i.e., such as "I log on and respond to email every Monday, Wednesday and Saturday") and/or inform students that email messages, etc., will be responded to within a certain time (2 days, 3 days, etc).

IV. The Mechanics of Online Education

Teachers require a basic understanding of and comfort with computer conferencing systems. While expertise delete, and forward messages in CC and email - open, close, and delete conferences and subconferences -join and remove conference participants.

The skills necessary for operating an online educational environment are basically those that will allow the teacher to be able to design and manage an online educational activity or course.

Conclusions:

This paper addressed the issue of teaching online: how to turn a computer conference into an environment for group learning. The focus was on how to structure and sequence group learning activities, using a computer conferencing system. Experience in online education at OISE (the Graduate School of Education at the University of Toronto) and Simon Fraser University, BC, Canada, indicates that the amount of contribution and exchange in a computer conference is potentially large in total, maintained over time, and evenly distributed over the participants. University-level students engaged in active writing, generating a large database of ideas and information.

Various forms of group learning were described for the online environment:

1. Plenary seminars
2. Small group discussions
3. Learning partnerships, dyads
4. Small working groups
5. Team presentations/moderating by the learners
6. Simulations or Role Plays
7. Debating teams
8. Peer learning groups
9. Informal spaces for socializing, such as an online cafe.
10. Mutual help
11. Access to additional educational resources (References, InterNet, ComServe, Library, Groliers encyclopedia, Eric, etc).

Conferences supported the various group learning activities. Conferences were structured by topic, task, group, and duration. Structuring of computer conferences was able to facilitate:

- high levels of learner input,
- peer interaction,
- group learning activities,
- even distribution of communication
- user motivation, sociability, and satisfaction
- opportunities for thoughtful and reflective input.

Notes (from page 1)

ConnectEd=Connect Education, affiliated with the New School of Social Research OISE=Ontario Institute for Studies in Education (Graduate School of Education, University of Toronto) NJIT=New Jersey Institute of Technology SFU= Simon Fraser University, Burnaby British Columbia, Canada WBSI=Western Behavioral Sciences Institute, La Jolla, California.

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Guidelines For Conducting Instructional Discussions On A Computer Conference

by
Mark E. Eisley

A Graduate Program Based on Computer Conferencing

Overview

Boise State University (BSU) offers an entire graduate degree through distance education, and more specifically, through computer conferencing. It is the M.S. degree in Instructional and Performance Technology (IPT). This is currently the only degree program offered by the university which can be completed either through traditional, on-campus classes or through an entirely nonresident option. In terms of its delivery method and scope, it is one of the first of its kind in the entire world.

Both the traditional and the nonresident IPT options prepare students for careers in the areas of instructional design, job performance improvement, human resources, training, and training management. Such careers exist in a variety of settings, such as business, industry, education, the military, and private consulting. Students learn how to design and evaluate both instructional and noninstructional interventions aimed at improving human performance.

Time- and Location-Flexible Classes

Students all over the North American continent (and a few overseas) participate in BSU's IPT program from their home locations through distance education classes. A number of IPT students local to the Boise area also prefer to take the courses we once called "distance courses." The irony of "local" students taking "distance" courses led us to realize that the critical attribute of these classes was not the "distance," but their time flexibility and their location flexibility. Thus we had to coin a new term which more aptly describes the central element of these nontraditional classes. The term selected was time- and location- flexible (TLF) classes. The increased accuracy of this terminology does not, however, negate the fact that the majority of students enrolled in TLF courses do in fact reside far away from Boise. While they are sprinkled all over North America, most of our distant students live on the east cost. Four of them live in Canada (from British Columbia to Nova Scotia). From application to diploma, most of our students never set foot on the BSU campus. We are set up to grant diplomas to students whom we will never meet face to face.

TLF classes are conducted by computer conferencing (via personal computers and telephone connections). TLF classes are distinct from correspondence courses in many important ways. Two of these are: (a) each student in the class sees the questions and comments of all the rest of the students in a natural flow of normal class discussion; and (b) interaction between teacher and student and among peer students is much more immediate and natural than possible through mailing systems. Computer conferencing permits (and encourages) a high level of interaction among class members.

TLF classes are delivered through a combination of media in *addition* to the medium of computer conferencing. For example, for any given course, the media used might include printed materials, videotapes, audio tapes, computer-assisted instruction, other computer tools (such as authoring systems, data bases, etc.) slow-scan video, facsimiles, and personal telephone contact.

The distance option of the IPT program uses the *same admission standards, instructors, and required courses as the on-campus option*. However, the tuition is higher than for on-campus classes, and special equipment is required. The curriculum lends itself to students taking one or two courses per semester (including the summer session) in order to complete the program in two to four years.

In order to be admitted to the distance option, applicants must own or have convenient access (a minimum of 2 hours per day, 5 days per week) to a complete computer system which includes the following components: an IBM-compatible computer with at least 20 megabytes of available hard drive space and color graphics (EGA or better) capability; a Hayes-compatible modem (2400 BAUD recommended); either a 3.5" floppy drive or the means to convert 3.5" floppies to whatever size and density typically used by the applicant. Distance students are encouraged (but not required) to gain access to a fax machine for both sending and spontaneous receiving.

The distance option is fully accredited by the Northwest Association of Schools and Colleges (NASC). Distance students in the program have been enthusiastic about the rigor and value of their academic experience. The distance option clearly meets the needs of busy professionals who are seeking to increase their knowledge, skills, and credibility in the training profession, but cannot relocate to attend traditional graduate courses. (The appendix at the end of this report gives the comments of several students regarding the value and effectiveness of the TLF classes.)

Communication Architecture

Various types of communication software available on host computers enable participants to communicate with one another via text transmitted through modems

and phone lines. These can be grouped into three major categories: those designed for E-mail (electronic mail), those designed for bulletin boards, and those designed for conferencing per se. All three forms of communication architecture operate asynchronously. That is, participants need not log onto the host computer at the same time in order to communicate. Senders' messages are stored on the host for later access by receivers.

E-Mail

Figure 1 illustrates how E-mail works in actuality. Each user is connected to the host computer by network cable or phone line. In distance education, the link is through modem and phone line. Participants are not linked directly to one another. Rather, they are all linked to the hub constituted by the host computer. However, as Figure 2 shows, it feels to the user as though there is a direct link with every other user on the system. (If Figure 2 were complete with an arrow drawn in from each user to every other user, the figure would be nearly illegible; but that would more truly represent the number of private connections felt by the users.) With E-mail, senders relay private messages to system users one at a time. The best metaphor for such a communication system is, as the name "electronic mail" suggests, mailed correspondence.

Bulletin Boards

Electronic bulletin boards are one step higher in the hierarchy of communication architecture, because in addition to private mail capabilities, bulletin boards are built for handling public communication. Let it be pointed out here that "public" communications *are* possible through most simple E-mail software programs, but the method of accomplishing such is laborious. A sender would have to either manually send a separate copy of a message to each user on the system, or make use of "mailing lists" if the software permits. The nomenclature and command structure of E-mail are not really designed to perform bulletin type communication.

Figure 3 illustrates how an electronic bulletin board, much like the physical one in the student union, can be divided into separate areas where various bulletins are posted. Such organization does help to reduce the otherwise overwhelming task of navigating through numerous unrelated bulletins. However, within each subject area, comments can be addressed randomly and do not constitute a serial discussion. Thus bulletins do not lend themselves ideally to emulation of classroom discussion. This is not to say that they cannot be used as a vehicle for integrated, focused, linear discussions—but to use them for such takes a great deal of management and discipline on the part of the users. Again, the software is really designed with a nomenclature, command structure, and function set which best meets the purpose of posting bulletins, not conducting discussions.

Computer Conferencing

True conferencing software is the ideal supporter of instructional discussions which "feel like" a real classroom discussion. In fact, the transcript of an on-line discussion reads just like a transcription of an audio recording of a discussion held among students and teacher meeting simultaneously in the same physical classroom. The difference experienced by the computer conferencing participant is that the time required for the discussion to evolve is a period of days or weeks, rather than a period of an hour or so. For this reason, it is advisable to conduct several slowly unfolding discussions simultaneously. In this manner it is possible to hold the same number of asynchronous discussions within in the same semester time frame as are normally held by meeting in a classroom for an hour three times per week for synchronous discussions.

Figure 4 compares computer conferencing to a series of related letters to the editor in a newspaper. In such a series the sequence in which contributions to the discussion are made is important. Persons reading letter 3 will understand it better if they have read letters 1 and 2 first. The letters constitute responses to one another in a chronological order. Time (at least a day) elapses between each response. Several such chains of discussion can be unfolding in the newspaper simultaneously. The process is very similar to computer conferencing, except that the medium is electronic rather than paper. Another appreciated difference is that many contributions can be made to any given discussion in a day's time frame.

The special kind of software available to support a true conferencing environment contains features which lend themselves to concurrent chains of discussion responses. They also contain all the facilities needed for bulletin boarding and E-mail. The IPT program at BSU uses all three levels of features (conferencing, bulletins, and E-mail) in conducting TLF courses. The program does not make much use of the software's bulletin-type potential to do lecturing, mostly because students prefer paper-based readings/lectures which are more time-enduring, annotatable, highlightable, and physically referable. The program does make extensive use of the software's E-mail capability for private student interaction, personal concerns between student and teacher, submission of assignments and return of personal feedback on tests and assignments, etc. But for BSU, computer conferencing actually finds its highest and most distinctive application in conducting "classroom" discussions.

In the BSU program, discussions on several discrete topics occur during the course of a semester. Some of these overlap time-wise or occur simultaneously. Examples of titles for such discussions are given in Figure 5.

Making Discussions Effective

There are two key principles for effectively guiding the use of computer conferencing discussions for instruction:

1. Design the discussion ahead of time.
2. Manage the discussion in process.

If either of these steps are omitted, computer conferencing discussions tend wander aimlessly. The

resulting discussion may turn out to be interesting, but minimally productive.

Designing Discussions Ahead of Time

With regard to designing the discussion ahead of time, the following advise is given:

1. Tie discussion plans to your objectives.
2. Make sure your points get made.
3. Structure the discussion.

Tieing Discussion Plans to Objectives

Obviously, a first step in tieing discussion plans to objectives is to establish what you hope the student will learn. Libraries of material exist on this aspect of planning discussion, and do not need to be discussed here. It is sufficient to point out that once objectives are established, it is important to design your discussion plans around whatever purposes you have in mind. College instructors can easily be more topic-oriented than objective-oriented in conducting classroom discussions. The same is true in computer conferencing discussions, but the consequences seem to involve even more entropy than results in a traditional classroom. Just having students bring up any points they may in an on-line discussion to help "cover the topic" ends up being very low-grade instructional ore.
In order to tie discussion plans to one's objectives, it is important to determine which of the "phases of instruction" the discussion is aimed at. Phases of instruction have been described in a number of ways by a number of authors. One simple schema contains the following five steps:

1. Preparation
2. Presentation
3. Practice with Feedback
4. Evaluation
5. Follow Up

Determining which of the phases of instruction you are trying to conduct using computer conferencing helps you to gain a clear view as to what you hope to achieve in the discussion. For example, if you are in the "preparation" phase, your goal will be to arouse interest, to review prerequisite material, or to tie the new discussion in with what has preceded it in the course. These goals are quite different from a discussion which is aimed at the "practice with feedback" phase for the same unit or topic. And so the way the instructor designs and manages the discussion will be quite different in different phases of addressing the same topic or learning objective.

Making Your Point

After first planning the discussion objectives, it then *does* become appropriate to focus a bit on content. One of the activities of the planning stage for an on-line discussion is, in fact, to plan what points you hope will be brought out in the discussion. Creating a list of these points does three things: (1) It helps you see more clearly ways you can stimulate students to bring out or discover those points without you having to spoon feed them. (2) It allows you to manage the discussion more efficiently. (3) While conducting a discussion, checking your list to see if all your points have been brought out gives you some clue as to whether to end the discussion and go on to a new one.

Structuring the Discussion

Structuring the discussion involves four main activities:

1. Focusing the content.
2. Specifying the format.
3. Avoiding structures which invite nonresponsive communication.
4. Avoiding structures which invite redundancy.

Focusing the Content

The introduction to a discussion tells students exactly what you want them to do. It is in your "kick-off" statement that you communicate the structure, forma., and rules of the discussion. In an introduction, the boundaries on the content need to be fairly narrow, otherwise the discussion will wander. For example, "In this item, let's discuss self-esteem," would invite such broad discussion that there would be little direction or cohesiveness. A more content-focused introduction would be, "How does self-esteem affect the success of incentive systems? Please give examples."

Avoiding Nonresponsive Communication

It is all to easy to fall into the trap of giving an introductory statement which invites too much self-referenced communication. This means that the discussion inputs of each student will refer only to his or her own experience or viewpoint. Comments on their peers' contributions are minimized. Each response is independent of all others. It produces a nonresponsive environment which is a little akin to the bulletin board environment where there is no sequence or dialogue to the individual items posted. Sometimes this is desirable (such as with, "Each of you give an example of bias in interpreting data."), but more often it is not. An example of an introductory statement which almost demands that students be responsive to one another is, "Work together to propose a group recommendation on how to improve the feedback system in the EverRite case study."

Avoiding Structures Which Invite Redundancy

If in the introduction to a discussion you imply that each student should give an answer regardless of how redundant it may be with other students' answers, you set the discussion on a course for low productivity and boredom. For example, if you say "Each of you give a definition of efficiency," you are likely to get 20 repetitions of essentially the same definition. It would be better to say, "Each of you suggest a way your employer could be more efficient. Please comment on one anothers' suggestions regarding how well you think they would work and whether you have tried something similar."

Specifying the Format

Some of the discussion formats which you might wish to try are described below. These formats help to keep discussions interesting, focused, and productive. Rather than define the formats, they are identified with a title and then illustrated with an example of the type introductory statement that might be used.

The critique.

The critique. "Here is a sample proposal for a formative evaluation study. Please point out its strengths and weaknesses. What would you do to improve it? Each of you make only one or two comments until others have also had a chance to respond. In other words, please do not try to do the whole critique yourself!

The group report.

The group report. "Susan, Linda, Fred, Daniel and Jan: Please work together under a restricted conference and research the various methods of doing cost assessments for instructional programs. Summarize your results and report them back to the group under discussion #24. Once you report, the rest of the class will be invited to ask questions of you five."

Twenty questions.

Twenty questions. "Pretend I am your client and you are an instructional designer. Please interview me in a group interview to try to narrow down what I really need you to develop for me. I will give you a first clue and then you should ask clarifying questions to arrive at what it is I really want. (This clue is a request I actually received once!) CLUE: We want you to make us a video tape on how to do maintenance work on our new line of printers."

The poll.

The poll. "Each of you register your vote privately with me (use E-mail) on the following issue: Can you have efficiency without effectiveness? I will only reveal the poll results and will not reveal how specific individuals voted."

Timed disclosure.

Timed disclosure. "In one paragraph, please defend why you do or do not think parties who are not paying for an evaluation should have a say in what the evaluation addresses. Send your justification to me by private message. At a certain point in time I will share all of the arguments and their authors, but I do not want you to be too influenced by what others are saying until you have all had a chance to respond. After I've received all your paragraphs, you'll have the opportunity to comment on one another's rationale."

The assigned debate.

The assigned debate. "John, Maxine, Larry, and Todd: please take (such and such) a position. Lucile, Corinne, Lee, and Frank: you take the opposite side. Now please debate the issue."

Free association.

Free association. "I'm not going to structure this discussion too much—we're just exploring ideas to peak your interest in the topic of consulting. What are your thoughts and ideas on this subject?"

The hot seat.

The hot seat. "Zach, your in the hot seat now! I want the rest of the class to ask you questions about why you selected naturalistic inquiry as the method for your evaluation proposal."

The Socratic dialog.

The Socratic dialog. "Class, we're going to bat this one back and forth. First I'll ask a question, then one of you answer. Then I'll ask the next question and someone else answer, and so on. Every other comment will be from the instructor (unless there's something you've just got to break in and say or ask!)"

The shot gun.

The shot gun. "This discussion is to get you thinking about a lot of related topics relating to the differences between training and education. I'm going to raise them all at once and you answer which ever ones appeal to you personally: Ready? here goes:" This is then followed by a set of perhaps ten related questions.

Go around the circle.

Go around the circle. "Let's go around the 'circle' and each of you tell the class why you selected this major. After each of you has responded, we'll close this item and move on.

Guided discovery.

Guided discovery. "Class, rather than give you the conclusions Stumpps and Grig laboriously came to about the use of CAI, I will tell you the first thing they learned and ask you to raise succeeding questions. Each time you hit on a question they raised and answered, I will give you the results of their research."

Blind man's bluff.

Blind man's bluff. "Since evaluation is primarily a technical process, what part does politics play in evaluation?" In this case the initial premise is **purposely misleading** and students will eventually bring out the point that evaluation is only **partially** a technical process and that it is also largely a political activity as well as a human communications activity.

Managing the Discussion in Process

Once a discussion is appropriately designed, using the principles outlined above, it is also necessary in the implementation stage to manage the discussion. Entropy abounds in on-line discussion. It takes the constant addition of energy to the system on the part of the instructor to keep the discussion on course. Students are often not disciplined at following directions explicitly. They need to be reminded and guided. Management techniques such as the following may be required.

1. Reinforce good discussant behaviors by saying things on-line, like "Thanks for responding so effectively to Judith's question, Barry."
2. Request change in poor discussant behaviors by tactfully pointing out the preferable behavior. For example, "Class, I would like to reiterate my request that you be more directly responsive to one another's comments."
3. Spur participation when lagging by directly requesting it. For example, "I notice that not many of you have commented on this issue. Let's have a little more response in this discussion."
4. Move misplaced content. If a student makes a contribution under the wrong discussion heading, move it immediately. Many students do not bother watching what the original intent of the discussion was and may follow the errant lead of the student who misplaced their contribution.
5. Vary who participates by privately asking the overly outspoken to wait a few responses before contributing, privately asking less outspoken individuals to participate more actively, and calling on specific individuals just as a teacher might call on a student in a traditional class to respond.
6. Occasionally, have a student conduct the discussion.
7. Summarize occasionally throughout the discussion, especially if it is a lengthy one.
8. Handle tangents appropriately. For example, "Lynne, that's a great issue you brought up, but let's get back to the original topic. If some of you want to discuss Lynne's issue with her, please do so under the open discussion #27.
9. Give a decisive end to each discussion. Don't let discussions drag on after they have served their purpose, since doing so will distract from other discussions where students should be focusing.

Developing A Learning Community In Distance Education

by
Robin Mason

INTRODUCTION

In the last few years there has been a considerable growth in the use of computer conferencing in Europe. The European Community (EC) has funded a wide variety of projects involving conferencing and electronic networking, and this initiative has lent support to other institutions to embark on applications in the area of training, education and business communication. The Open University in the UK pioneered the use of computer conferencing in mass distance education, and since its beginnings in 1988, many other educational institutions have followed suit. Although some applications involve global networking, such as links between schools all over the world, and distance teaching institutions offering their courses to anyone who can access their host machine, many of the initiatives are specifically directed at developing links amongst the various countries of Europe.

In addition to practical applications of computer conferencing, there has been considerable research into two related areas. Firstly, network issues - compatibility, standards and access, have been substantially funded by the EC and to a lesser extent by the Public Telephone Companies. Secondly, software development - new conferencing systems, upgrades to existing software, and design of front-ends to conferencing systems - has been carried out at European universities and software companies.

One of the stipulations of all EC funded projects is that they must involve the collaboration of several partners, usually educational institutions and industry, across several European countries. This has led to the need for considerable collaboration and communication, which in turn, has fuelled the uses of computer conferencing. Although this is not an ideal tool for collaborative work, the need for an electronic communications medium widely accessible from many sites and different countries and allowing joint preparation and redrafting of papers, has given tremendous impetus to the research and development of such tools.

COMPUTER CONFERENCING AS A TOOL FOR TEACHERS

Because of the difficulties of access to computers outside established institutions, computer conferencing as a teaching tool has been taken up in limited educational settings - primarily, management, high technology subjects and teacher training, where equipment is usually provided by employers and institutions. Most schools throughout Europe have computers, though not necessarily in convenient locations or linked to a modem. Nevertheless, there are increasing initiatives involving electronic communications between teachers, either as teaching tools in the classroom, or as an in-service training medium.

Riel (1990) underlines the need for teachers in isolated classrooms to participate in the same kind of community learning environment which they try to set up for their students. She points out that:

> There have been a number of studies that have documented the change in students' reading, writing, science and problem solving skills when working on a network with students in distant locations (Newman, 1984; Riel, 1985; Mehan, Moll and Riel, 1985; Naiman, 1988; Cohen and Riel, 1989). Less attention has been focused on the changes that take place when teachers work together in this cooperative manner. (Riel, 1990: 451)

Her research with Learning Circles on the AT&T Learning Network shows that teachers working on educational networks consistently rate their own learning, not the learning by their students, as the most important benefit of the programme.

In this paper, case studies of conferencing applications involving teachers will be presented giving a range of uses of the medium: as a teaching medium for teachers, as a tool for teachers to use in their teaching and as a support and networking facility for teachers in the field.

CREATING A LEARNING COMMUNITY

As perhaps the most exciting offspring of the marriage between computers and telecommunications technology, computer conferencing is most effective at creating a sense of community. Newcomers to the medium are constantly surprised that warm, meaningful relationships develop easily and frequently. Comments from conference participants describe their experience:

> Despite the medium's inability to transmit the smiles (and glares) and other non-verbal speech parts enjoyed in face-to-face contact, I still feel more involved and part of things than I have done on other courses.

I have looked forward with excitement to reading this conference every time I logged on; and I have never been disappointed.

> Although in previous years I've never been aware of feeling isolated, the prospect now of going back to

the old system [without computer conferencing] next year frightens me a little bit.

Many students studying at a distance miss the social life and network of contacts which traditional face-to-face teaching offers. Conferencing cannot entirely substitute for this, but it can provide a unique kind of contact and atmosphere. Students can put up on the system queries and statements of their interests and 'meet' like-minded fellows or get information on their particular questions from the pool of system users. This is especially true when the students are adults with considerable expertise in their working lives.

The value of collaborative learning is increasingly recognised both in higher education and in training. Computer conferencing allows certain kinds of joint project work and peer learning exercises to be used with students studying at a distance. For example, role play and simulation games have been tried online; joint preparation of assignments are being used increasingly, and many examples of peer commenting on written work are described in the literature. The UK Open University will try a group assignment next year with 1500 students on an information technology course. Students will take part in discussions on the question set by the course team, and tutors will give individual marks to each student based on the quality of their input, the extent to which they comment on what other participants have said, and add new ideas and opinions.

The case studies which follow, are focussed on three themes: the use of computer conferencing in a large-scale distance teaching application; its use as a collaborative tool for teachers and students; its use as a means of communication amongst teachers across European frontiers.

CASE STUDIES

THE UK OPEN UNIVERSITY (OU)

The Open University is a large-scale dedicated distance teaching institution with over 150,000 students spread all over the country and increasingly in parts of Europe. By the end of 1992, the University will open access to students from all parts of the European Community. Although the primary delivery medium is printed units written by academics at the University, an extensive system of regional offices throughout the country organise tutors to mark assignments and run face-to-face tutorials in local study centres. After finding that the use of terminals in study centres connected to the University mainframe was increasingly difficult to maintain, a policy of home computing was launched in 1988, in which students purchased computers at discount or loaned a machine from the University. Over 20,000 students now use a computer at home as part of their undergraduate studies.

The use of the computer conferencing system, CoSy, on the course DT200, *An Introduction to Information Technology*, was started in 1988 with about 1500 students and 65 tutors. Other computer software was also used on the course - word-processing, spreadsheets and databases, in addition to a book of readings, considerable text material written by the course team, cassette tapes and broadcast television programmes. Now in its fourth year of presentation, many lessons have been learned about how to integrate computer conferencing into OU courses, how to structure conferences to get the right critical mass of students participating, and how to manage the system as a whole to provide support to students, respond to queries and keep the conferences free of extraneous comments. A number of important lessons can be drawn from the extensive evaluation (Mason, 1989; Mason, 1990; Mason, l990b) of this course:

- for relegating computer communication to a very small part (in this case, about 5%) in a course inevitably leads to marginalisation and lack of use
- the cost of telephone charges is a significant deterrent, particularly when learning to use a conferencing system and developing confidence in the early stages, has to be carried out at the student's expense
- it is possible with adequate support facilities (both software and human) to teach large numbers of students the rudiments of conferencing entirely at a distance
- the exploitation of conferencing to achieve educational goals requires careful and extensive structuring of the online environment so that both students and tutors can make productive contributions
- conferencing can tap the invaluable resource of adult students' experience and expertise to the advantage of all concerned.

Since the initial large-scale use of conferencing at the University, a variety of other applications are in hand. Other courses have adopted CoSy, notably in the Open Business School's MBA programme, and increasingly as an optional extra for students with suitable equipment. One of these is an education course, *Computers and Learning*, available both to teachers taking an undergraduate degree and to those wanting a single up-date course. As many teachers have access to a modem at their school, course team members, tutors and other interested staff have set up a number of conferences, for discussion of course material, exchange of experience with using computers in the classroom, and support for the project element of the course. Additionally, one of the case studies in the course material is an evaluation of the use of computer conferencing as a learning tool. Using extracts from a previous DT200 CoSy conference, students are taken through a critique of the conference interactions with an audio tape prepared by the course team. For example, on the facilitative role of the online tutor, the tape points out:

> The first student's reply to the tutor is to disagree with his description of the OU student working at home. . .So the tutor's input is being treated quite differently from the way it is treated when it is written in a course unit. The tutor does make an input, but it can't be compared with 'input' in the sense of 'what is to be learned'. Here the tutor's input was valuable

as a stimulus to the student to articulate their own understanding. But it wasn't taken as gospel.

On the use of students' personal experience as a valuable element in conferencing:

> You will have noticed that a lot of the discussion relies on personal experience, and sounds rather unacademic at times. It's an aspect of the informality of the medium that it's easy for students to talk this way. But that doesn't mean it has no academic validity. As students relate these issues to their personal experience it enables them to see more complexities in the issue; that it's not open to a simple analysis.

On the value of commenting on others' opinions:

> [Student x] is pushed to make this elaboration of his argument by the converse points made by [student y], so the interactive discussion in this way forces the re-articulation of his views, and allows [student x] to develop for himself a more elaborated understanding of the argument. This is important because it's in this way that discussion can lead to learning without any formal input from the tutor. [1]

The benefit of using computer conferencing at the University can be broadly described as the growing sense of an academic community - of students, part time tutors, regional staff and course developers. For those who participate on CoSy, there is a unique channel of communication which has had tangible as well as intangible results. Tutors have been involved in the maintenance and development of the course; regional staff have had a convenient means of coordinating activities; students have benefited from a real sense of contact with the course team as well as a supportive environment for learning; central staff have been more closely in touch with the presentation of the course and its effects on students. The very quick feedback loop which CoSy affords has revealed many problems, as well as positive responses from students and tutors, which the usual indirect and protracted methods obscure and dilute.

CAMPUS 2000

Campus 2000 is the major provider of online systems to education in the UK. It was formed in 1989 with the integration of two well established services, PRESTEL Education and The Times Network Systems, known as TTNS. Campus 2000 has used some elements of the PRESTEL database, which is a commercial service run by British Telecom for the benefit of business and home users, but now provides a vastly different range of features and services specially tailored for educational use. In addition to databases, Campus 2000 provides group mailing facilities for schools as well as the conferencing system, Caucus.

The facilities of Campus 2000 can be accessed from anywhere in the UK at local telephone charge rates, and this has led to a vast range of primary and secondary school applications throughout the country in all aspects of the curriculum. For teachers it provides specialist subject and project information as well as a flexible and dynamic resource for contacting other educationalists.

In addition to the local and national projects it facilitates, Campus 2000 has hosted much of the development work on distance education and computer supported cooperative services in Further and Higher Education establishments. It has actively fostered links with European schools and teaching institutions, and provides links to thousands of users with compatible mail systems in Europe and other parts if the world.

Links with France and Germany

Campus 2000 has been connected by a gateway link to Edutel, the teacher information service supplied by the French Education Ministry, and 25 schools in both France and the UK are taking part in 5 curriculum-based projects during 1991. Similarly provision has been made for up to 100 German schools to have direct access to Campus 2000 to take part in a programme of collaborative communication projects. The aim is to introduce communications more widely into the German school classroom.

One of the aspects of these links is foreign language learning. Campus 2000 provides access to the FELINE database's Modern Languages section which consists of carefully selected authentic texts, taken from French, German and Spanish satellite TV news broadcasts. Each text is accompanied by exercises at an appropriate level (GCSE and A level), and can be retrieved for printing out complete with all accents.

Of course, the system is used for pen-pal exchanges between students wanting to practice their use of foreign languages, but group events also take place. For example, during March of this year, two schools in Hampshire and a school in Germany launched a new activity based on the Campus Satellite Education Project. Pupils aged 13 simultaneously viewed a selection of news broadcasts on the ASTRA satellite in German and English. For two hours a rapid exchange of electronic mail took place from both sites in response to what was viewed. The organiser of the event from Hampshire commented: "It is my belief that communicating with Campus 2000 is providing exciting new links across international borders and is set to provide genuine sources for foreign language material. Perhaps more importantly, it is helping to establish more informed and more enlightened Europeans."

A Learning Environment for Teachers

A special conference for teachers is hosted on Caucus, called Staffroom. General issues such as teacher appraisal, smoking in staffrooms, and mixed versus single sexed schools have been discussed, along with particular requests such as ideas for the school musical, and more light-hearted exchanges. The Scottish Council for Educational Technology established a conference specifically to focus on Scottish issues, and

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[1] These extracts from Laurillard, 1989, are transcribed from an audio vision exercise in which an audio tape accompanies the conference messages on a computer screen.

another conference provides online access to consultants with experience of administrative, financial and staffing implications of Local Management of Schools. For an additional sum, consultants are available to answer particular queries on the management and implementation of the latest education reforms, legal and financial matters and information technology matters.

Undoubtedly many teachers find the introduction of electronic communication into the classroom to be an exciting and stimulating aspect of their own development. Not only does it allow teachers to prepare their students for the jobs of tomorrow, it prepares teachers for the changes in their own profession. As one teacher who has experienced the value of telecommunicating for his own development, comments:

> If we as teachers think that our jobs are in the 20% that won't significantly change, we are wrong. Education must and will change dramatically in the next few years. Thus we will need new tools for teaching - tools that can make the Global Village concept a reality in the classroom.
>
> Teachers, especially if they are trying new ideas in their classrooms, need to know that they are on the right track. It is often very difficult to find a person in your building or even in your district that understands what you are doing and gives valuable feedback. With a connection to a wide audience, you are able to find another teacher who can be helpful and legitimise what you are doing.
>
> For me, telecommunications is exciting and fun. I find that, when I as a teacher enjoy something, the kids are more motivated to learn. (Hay, 1989)

Obtaining professional qualifications is also possible online. The Department of Further and Vocational Education at the University of Ulster has chosen Caucus as the main medium in plans to introduce distance learning into its two year part-time course which leads to a professional teaching qualification - the Advanced Diploma in Education. The course caters for nearly 200 candidates, most of whom are lecturers in the 26 colleges of Further Education in Northern Ireland. Having already used computer conferencing on short in-service training courses, they find that it has many advantages in allowing a much higher degree of flexibility to be exercised by both staff and colleges. They also find economic benefits for their teachers, by reducing the number of miles they have to travel in order to study for a diploma.

Resources for Teachers

Campus 2000 has been active in promoting direct curricular uses of its online systems by acting as an intermediary to business and industrial organisations seeking to demonstrate their commitment to education. This has led to a variety of business-sponsored projects and resources for teachers. For example, the Midland bank supports an online database of banking information, and to complement this, they have prepared a booklet containing student assignments and a guide for teachers giving ideas and examples of ways in which the online resources can be used in the classroom. The English Heritage association has also sponsored an online history project, involving email and a software package for designing a castle. Participating schools receive daily clues via email relating to the location and construction of a real castle, which will enable them to build a 3-dimensional model to scale.

In the past databases in school science have been used to confirm theory or as a basis for induction, not as a means of testing hypotheses. A new project on Campus 2000 aims to change this. The National Environmental Database Project is aimed at upper level science students, and has been sponsored by British Nuclear Forum. Students collect data about the environment using experiments and questionnaire surveys. Using specially developed software, this data is sent to Campus 2000 and made available to other schools in the UK and abroad. Through discussion on a chosen topic, students are encouraged to form hypotheses which then require methods and data in order to test. Access to data from other schools allows testing of the hypothesis from a broader sample.

As these many examples demonstrate, Campus 2000 aims to connect communities of people with common interests. Teachers are at the same time the mainstay and the beneficiaries of this network.

PLUTO

PLUTO is a loose cooperation of individuals and institutions involved with teaching and teacher training in Europe, and engage electronically in exchange of ideas, experiences and educational material related to the classroom in many subjects. As a communication medium they use the PLUTO European Network, which is based on Bitnet, UUCP and Janet.

The participants are faculty members at teacher training colleges or universities, student teachers, classroom teachers and their students at general and special schools, and finally, trainers for in-service training institutions of private enterprises. At present they have email connections with participants from over 14 European countries.

The project has three overall educational goals:

- The first is to introduce into teacher training, skills in the use of information and communication technologies, which are expected to be commonplace by the end of the century.

- The second, and ultimately the more important, goal is that of identifying those new forms of classroom activity, and changes in the learning environment, which are brought about by the use of new information and communication technologies.

- The third is to establish practical collaborative projects which practise these activities and to disseminate the results of these into the wider teacher training environment through a widening of the participation in the network.

The central concept of the PLUTO project has been identified as 'collaborative distance learning'. That is, the project explores the new modalities of learning that become possible when educators who are geographi-

cally and sometimes culturally remote from each other are enabled to work together on shared projects and to become resources for each other. This approach has the dual advantage of developing their understanding of the technologies and their international perspectives at the same time and by the practical use of the technology itself. In this way it creates an awareness of and a respect for, the cultural diversity which is part of Europe's educational heritage.

PLUTO's management style devolves the ownership of its projects to the nodes themselves. Each participating institution is expected to run and manage at least one major activity or project and to take part in four additional ones run by other nodes. In this way the central group coordinates and manages rather than imposes, and the flexibility of a wide range of projects which are of real interest to the regional organisations is emphasised. The results are made available to the whole network, and these should be in the form of deliverable items such as teaching materials and databases.

CONCLUSIONS

Computer conferencing is an increasingly valuable medium for teachers - as a means of training and updating the teaching profession, as a resource for supporting teachers in the classroom, and as a facility for networking teachers themselves. Conferencing also plays a role in the mutual understanding of different peoples of the world, in opening horizons to wider perspectives, and in creating friendships across international boundaries.

As a new medium for distance educators, computer conferencing brings interaction, feedback and active participation to the student studying at a distance. It reduces the sense of isolation and brings flexibility and convenience to the life-long learning needs of adults.

Finally, computer conferencing creates communities, new groupings of people based on mutual interest rather than geographical proximity. The value of this facility for education is unprecedented; we have only barely scratched the surface in exploiting its potential.

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Extending the RJ-11 Connection for Audio and Computer Conferencing

by
Larry Hudson, Robert Paugh and Phyllis Olmstead

Overview

Using computer conferencing as a medium for teacher education is a benefit to the profession. This use exposes teachers to high technology. Teachers at remote sites, who would not otherwise benefit from university courses due to logistics, can be included. There is the benefit of reaching larger numbers of active intelligent students (Jordahl, 1991).

Human nature resists change; using technology is no different. Unless an educator was trained on computers, worked in the computer industry, or was just intrigued by computers, few ever spend the hours needed to learn to use the equipment (Kotrlik & Smith, 1989; Smith & Kotrlik, 1989). This thought is recognized as a road block to staff development (Kinnaman, 1990). Some educators who use the typewriter do not see the potential of the computer especially if they struggled with mastering the typewriter.

A student registered for a computer-conferencing class will have no choice but to learn computing in a very short time frame. This intense training is just like a six-week summer term. There is no time to waste and superficial attention to the subject would be detrimental. Training of teachers on computers is discussed intently by Kinnaman (1990) as being an integral component of purchasing technology by every district.

The novice computer user will need to network with other students and computer users in order to make it through difficulties. The technology "bug" will bite most of them, and they will look for every computer conferencing course they can find. They will look for opportunities to introduce conferencing in their classrooms and will seek out grants for expanding technology at the school and at home (National Research Council, 1988). Many students in remote areas will be able to obtain coursework that is not convenient or accessible in the conventional sense. Teachers who work full time are unable to attend recertification or degree advancement courses unless they are within an acceptable driving zone of a major university or off campus facility. In some major cities attending class at night might mean rushing twenty-five miles or more through heavy traffic to make it to a class that starts shortly after work hours. Traffic problems, long distances, time constraints, and toll fees are serious considerations for some educators, especially in this time of educational funding cutbacks.

Not all students live within easy commuting distance of a university community. There are professional educators who choose to live in remote or rural areas far away from the hubbub of a major campus. Through long distance learning students can actively share their experiences with fellow students and teacher educators. A combination of audio and computer conferencing mediums provide access to the university and empowers the adult learner.

History of Teleconferencing at the University of Central Florida

One of the authors first used audio teleconference in 1979 while working as a graduate assistant at the University of Iowa. In 1982 upon beginning a position as a faculty member, he proposed the use of audio teleconferencing for vocational education courses, not because of the weather or mountains, but because of traffic and few students at each site. In January 1984 the first courses were taught using Radio Shack speaker phones purchased by the UCF Alumni Association and the university operator for connecting the parties. This extended the RJ 11 connection for providing courses for distant learners. The use of the university operator was hindered by the switch board closing at 6:00 p.m. In 1985, time on another local bridge was borrowed for use. This was the first bridge used at UCF for an audio teleconferencing course. Purchase of an audio bridge for the university was completed in 1986 by combining funds from five different sources on campus: Business Services, Sponsored Research, College of Education, Administration and Finance, and Instructional Resources. Equipment necessary for audio teleconferencing includes: telephone and handset, headset or speakerphone. Applications include committee and administrative meetings and courses. Transmittal can be through an operator, a service, or a "bridge." Costs for "local" calls are nothing but direct dial can be used for "long distance" calls. Since then, primary use has been by the Vocational Education faculty with three of the four faculty having taught over 20 courses using audio teleconferencing. Acceptance of telephone technologies has not been broadened to other faculty within the College of Education and the University as a whole. Maybe it's the technology or the change process, but some faculty are afraid of it. As one person said in a faculty senate meeting "pretty soon nobody will be here. We'll just have boxes talking to each other" - which is not the case.

To identify attributes of successful audio tele-conferencing instructors of a modest in-house research project funded a survey. Using a national directory of persons conducting audio teleconferencing; the following items were determined by percentage to strongly agree/agree with the item as being an attribute with no item having less than an 80% agreement (Hudson, 1989). The top ten items are listed for each category.

General Characteristics

1. Generates enthusiasm during session
2. Gains participants' attention
3. Demonstrates credibility as an instructor
4. Elicits participation of students
5. Maintains participation of students
6. Actively listens during session
7. Has commitment of instructional leaders
8. Has funding
9. Has staff support
10. Requires more planning than traditional course

Personal Characteristics

1. Positive attitude
2. Adaptable
3. Enthusiastic
4. Flexible
5. Responsive
6. Confident
7. Innovative
8. Encouraging
9. Approachable
10. Supportive

Aren't some of these characteristics the same as one should have for "regular" teaching or for using other telephone technologies? In 1987, a pilot project with the Racal Milgo Corporation using freeze frame technology was initiated for one year. During courses additional equipment such as a camera and a cart hindered acceptance of these two technologies. The equipment is still housed at the University on a permanent loan from the Racal Milgo Corporation.

Pilot Project Center for Education and Training for Employment Ohio State University

In January 1989, a representative of the Vocational Education Consortium from Florida was contacted regarding a faculty member from the university system attending a training session using "Participate," a computer-conferencing software from the Compu- Serve service. Other faculty were offered a chance to attend, and for one reason or another, were not able to attend. One of the authors was offered the opportunity to attend a seminar in the Spring of 1989 at the CETE/OSU here in Columbus to learn how to use "Participate" for teaching courses. Two faculty from the state of Florida were in attendance at this session (Rosemary Baum, FIU, and Larry Hudson, UCF).

We would like to say that over the summer internal thought planning about application occurred, but that's not actually the case; actually fear of this new technology, another extension of the RJ 11 connection using a computer and a modem, prevailed. Maybe it was transference and maybe it was the addition of a new technology, but it was a little intimidating to add this "new" technology.

The calendar of events was:

Step	Date
Call for interest	January, 1989
Training	January, 1989 - 2 days
Thinking	Jan. - Aug., 1989
Requests for course	August, 1989
Call for accounts	August, 1989
Registration	August, 1989
Self review	September, 1989
Student training/first class	September, 1989 - 2 hours
Getting on-line	Sept. - Nov., 1989
Assignments completed	Oct. - Nov., 1989
Graduation/presentations	December 6, 1989

During the 1989 fall semester, the pilot project using audio teleconferencing and computer conferencing (electronic mail) began. Accounts were established for each of the ten students in the course and each student did access the system; some to a much greater extent than others, and some only accessed the system within the last two weeks of class. The plan for using computer conferencing was introduced at mid-term after succeeding at audio teleconferencing. One technology was again added to another, further extending the RJ 11 connection. Not all students in the class had access to computer, much less a modem. Modems are still not common in the classroom or the schools. The computer as a stand alone PC may be available, but modems connecting to computers outside are not available everywhere. All ten students did complete the course and had some success with the technology and computer conferencing. During December of 1989, the American Vocational Association annual convention was held in Orlando. All students were requested to attend and be co-presenters at a meeting during this convention. Each of the ten students offered a five minute critique of the pilot project from their perspective. Overall, this pilot project was very well received.

Pilot Project Florida Information Resource Network (FIRN) UNIVERSITY OF CENTRAL FLORIDA FIRN System

The "fundamental goal of the FIRN is to provide Florida's educators with access to computing resources that serve public education" (FIRN, 1990, p.I). The primary mission is to "provide electronic pathways and procedures enabling users to utilize computing resources located in public education data centers throughout Florida" (p.4). In the inception of FIRN primary use was administrative but now more instructional applications have been added.

Funding for FIRN is provided annually by the state legislature from general revenue appropriations. This funding supports ongoing and pilot projects across the state.

Discussions of a possible pilot project were initiated during the 1990 fall semester. New software and system changes to the Florida Information Resource Network (FIRN) would be completed by the end of January in the spring semester. After a small delay, preliminary information was provided and accounts established.

The graduate course in Vocational Education had, as the primary emphasis, program improvement. Access to databases was a critical element as well as electronic mail and computer conferencing.

Students were later requested to attend an orientation session of the FIRN system at the main campus at which moderate success was achieved in logging on the FIRN system. Ten students registered and began the course using audio teleconferencing. The students were from nine locations in Florida. Some of the students were outside the designated "Service Area" (Appendix A) but wished to participate in the course. Some students were "on-line" the next day, while newer students weren't able to get on-line until later.

Equipment setup.One of the more perplexing things about new computer systems is that they are structured in multiple layers with unfamiliar terms. Each new piece of equipment or program comes complete with a new vocabulary to learn. The world of modems and telecommunications is no different. Without a firm mental image and knowledge, things can become very confusing.

The important components that are necessary to deliver computer conferencing include: the computer (CPU) monitor, modem, and a telephone. The authors' preferred system is -

Computer: an IBM PC XT, AT PS/2 or compatible computer.

Memory: at least 192K of available RAM.

Operating System: PC-DOS or MS-DOS, version 2.0 or later.

Disk Drive: at least one floppy drive, or one floppy drive and a hard drive.

Display: a monochrome monitor and display adapter, a composite monitor with a Color Graphics Adapter, an EGA monitor and EGA display adapter, a VGA monitor and VGA adapter or a monitor and adapter compatible with any of these.

Modem: virtually any modem, Hayes compatible, external or internal, any speed.

The computer is a digital device that "talks" in binary code with a vocabulary of ones and zeros. The telephone network is an analog system which uses varying tones to communicate.

The modem is a device that speaks both the "Analog" and the "Digital" languages and translates between them.

Modems purchased for use with the computer are either internal or external. An external modem is housed outside of the computer and is easier to install. It requires little computer knowledge to install following the directions provided with the modem.

Modems are available from mail order computer stores, or from your local computer store. Modems are built in one or more different speeds known as the baud rate. It is more cost efficient for on-line time if you purchase a modem at the faster rates, such as 2400 baud. In addition, modems should be Hayes compatible as Hayes is the standard for modem communications. A modest price of $85.00 would purchase a good 2400 baud modem.

Installation is a two-level process consisting of the hardware installation and the software installation and configuration. Software is the "stuff" which permits the computer to do all the wonderful things that it can. It is the coded language that controls the computer hardware. Software is often called by different names depending upon the specific task it was written to perform. When the purpose of the code is to control such mundane yet important tasks as handling disk files, screen displays, and microprocessor interrupts, the software is called the "operating system". Spreadsheets, word processors, and communications software fall into the class called "applications software".

Before using the modem, the operator must be sure that it is set up correctly. This depends on the use of an external or internal modem. The set up for external and internal modems are quite different. Therefore, this paper will not detail how the setup is done. The most important aspect is to follow the documentation that comes with the modem. In addition to setting up the modem, the operator must also reconfigure or change settings in the computer's operating system to work with most communication programs. If using a hard disk drive, the config.sys and the autoexec.bat files should be modified. Again, this depends on the computer and the communications software being used. Most all software programs must be configured to work with a particular computer. It is important to read the documentation that comes with the software as most software today has an "install" program. If the install is not followed correctly, the program will not run or work properly. Computer connections are initiated by having the modem dial the telephone number for that computer. Besides knowing the telephone number of the other computer being called, the operator must know some additional information such as baud rate, parity, and data bits. All of this information should be provided by the System operator (SYSOP) with whom the operator is communicating. All of this sounds very complex but with patience, it will be possible to enjoy the wonderful world of computer conferencing.

Faculty perspective of the FIRN/UCF pilot project. When one uses different computer systems as faculty and students do — one term does come to mind - user friendly. That means not only the equipment but also the software.

Another comment also comes to mind. Naisbitt says in *Megatrends* (1982) "whenever new technology is introduced into society there must be a counterbalancing human response — that is, high touch — or the technology is rejected" (1982, p. 39). In all of our audio teleconferencing activities we have tried to maintain "high touch," in response to this comment and to the research completed by the University of Wisconsin - Madison, and others over that last 20 years on audio teleconferencing. Personalizing makes it successful. This sense of "high touch" can come through in audio *and* computer conferencing. One of the major strengths in using the FIRN system for electronic mail and computer conferencing is accessibility. The system is accessible to all public school personnel in the state of Florida through a "local" or 800 number so that there is no charge for a long distance call (Appendix B). In this course the ten people who enrolled were requested to have access to a computer and a modem from either work or home. The FIRN network provides a means of sending electronic messages to one or multiple parties simultaneously and setting up conference topics for discussion.

At the end of the pilot project two of the students in the course (Cynthia Woodley and Phyllis Olmstead) participated in the development of a video tape demonstrating access to the FIRN system. Both Jim Neill and Bill Schmidt came to Orlando from Tallahassee to participate in the interviews and demonstrations of the procedure for accessing the FIRN system.

The technology should not overpower the content of the course. In the spring semester difficulties with the on-line audio teleconference bridge overpowered the content of the course and the course suffered for that reason. In that respect use of the technology must be high touch or user friendly, so that faculty and students can and will use the system. The ability to control time working for the class and sending messages electronically is of paramount importance to students, especially those who are full time teachers and administrators. They can get on-line in the evening, if they are "night people," or in the morning, if not a night person. A student can get on the system at five o'clock in the morning, receive and answer messages, and be done for the day. It is important to log on to a system on a regular basis.

Listed below are some student attributes for using telephone technologies as observed by one of the instructors (L.H.):

1. sense of adventure
2. risk taking
3. patience
4. persistence
5. support of significant others

With ten or more students, one is on everyday and, if the instructor does not go on-line for three days or even a week messages can pile up. It's like checking the mail; it is overwhelming if not continued on a regular basis.

After completion of the course, students were asked to provide feedback. Items used were gleaned from a review of literature in 1985 and have been used for audio teleconferencing as well as computer conferencing courses.

Certain demographic characteristics are important to discuss. Four of the nine students had completed three or more courses using audio/computer conferencing and four participated from their homes. Four saved one to two hours while two others saved over three hours per weekly session. Although mileage may not be as critical as traffic, miles saved per week overall were significant.

Related to the teleconference items, overall response was positive with 15 of 17 items having a mean of 4.1 or higher of a possible 5.0 points - with the caveat that only nine people were involved. A very high rating supported the methods and future involvement in courses using these technologies.

Student perspective of the FIRN/UCF pilot project. The graduate class offered in the FIRN pilot program was titled "Vocational Program Planning, Developing, and Evaluation." The three hour course included review of research and preparation of papers on the history of program improvement process, current procedures, and proposed program improvements. The review of research in the course was accessed via computer and modem. One database used frequently is the State University System's Library Users Information Service (LUIS)-an electronic card catalog, ADVOCNET and it's bibliographic retrieval sources, such as VECM and ERIC.

Local sources were obtained from the University of Central Florida library system through the use of Library User Information Service (LUIS). The on-line library media database is a program provided on the Florida Information Resource Network (FIRN). The user may access media by title, author, or subject. They will receive a response of an index of books with that title, by that author, or on that subject. A subindex may be presented for more detailed titles on subjects or by authors. A choice of a particular title will present a bibliography, subject headings, location of media in the library, the call number, and the availability of the material

This information will provide the long distance learners with a means of writing a "shopping list" of materials to investigate or check out. They can arrange their selection process by stacks or floors, according to the information, and leave off their list materials that are checked out or missing based on the availability note.

For example, an important text for an upcoming course was obtained through a bulletin on the Department of Education Bulletin Board on FIRN. Florida School Laws 1990 from the State Department is used as the only text for the Legal Aspects of Education course. The instructor of the course is currently using the 1988 edition because the newer editions have not yet been made available to the local bookstores. The day the 1990 edition came off the presses at the state department, the bulletin was posted on the DOE Bulletin Board and was available for only $3.91 delivered.

ADVOCNET, an electronic communications system on a national level for networking in vocational education, was also accessed. ADVOCNET is managed by the National Center for Research in Vocational Education. This system provided access to the national database Bibliographic Retrieval Service (BRS) which provides Vocational Education Curriculum Materials (VECM), ERIC, RIVE, and other databases for research and curriculum development.

ERIC Clearinghouse publications were accessed directly from the publishers after contacting Judy Wagner over the ADVOCNET electronic mail system. Research journals were accessed through the use of LUIS both from home and on-campus. When research journal articles were unavailable, requests directly to the authors were necessary. ERIC and Dissertation Abstracts were accessed both on CD/ROM at the main University campus and through the ADVOCNET system. All database information was available for downloading to a file or printer for future reference.

The FIRN system permitted personal conferencing with individual fellow students and groups with the professor. Students experiencing technology difficulties and communication blocks could easily "talk" to fellow FIRNS to discuss "how to enter a door" or utilize the programming to it's fullest. The FIRN system operators replied quickly to questions and were very receptive to questions from the "guinea pigs."

This pilot program required personal exploration of the state system and contact with national leaders regarding issues in Vocational Education. There were numerous databases and conferences on the new federal legislation and important state activities were accessible prior to the information "trickling down" to the local school district. Instant contact with state level officials, including the State Commissioner of Education was possible through FIRN.

The use of FIRN, ERIC, VECM, LUIS, Dissertation Abstracts and RIVE via computer and modem reduced the number of 50 mile and six dollar toll round trips to the main campus, for just this one student, not including students from greater distances. The ability to organize and plan the library "junkets" increased the availability of reading and composing time. Time compression is extremely important to the full time teacher/parent/student.

Electronic mail for individual and group messages or discussion of topics via computer conferencing empowered the students to manage their "class" time more efficiently for their particular lifestyles.

Summary

Will faculty in vocational education continue to use telephone technologies to take the university to the distance learner? *YES*, we will continue to use this technology. Quite a cadre of graduate students have been developed who are proficient in the use of audio teleconferencing and electronic mail/computer conferencing. They expect these technologies to be used. There is still hope that other faculty members will use these technologies to provide courses for the distance learners.

Use of these technologies provides increased access to sources of information and enhanced management of time. These issues were well stated by Naisbitt and Aburdene in *Megatrends 2000* (1990):

(1) "New technologies have changed the importance of scale and location and extended the power of individuals" (p. 301)
(2) "Computers, cellular phones, and fax machines empower individuals, rather than oppress them, as previously feared" (P. 303)

Teachers and students who use the RJ 11 - standard telephone connection empower themselves and what is learning, if not empowerment?

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Telecommunications Networks in Action: An Inter-university Project

by
Constance Pollard and Valerie Akeyo

As we enter the 1990's, the need for electronic communications networks in classrooms, among professionals and colleagues is increasing. At local, national and international levels, computer communications systems are being used to share ideas and information as well as to distribute materials.

In vocational education programs, teachers and students can benefit from electronic communications systems through collaborative classroom projects with other institutions. An example of such a project was conducted between the University of Idaho and the University of Nebraska-Lincoln (UNL) fall semester, 1990. In the project, students gained hands-on experience by using BITNET and Internet (wide-area networks) to exchange messages and search other institution's libraries.

The purposes of this collaborative project were to provide vocational education students with needed telecommunications concepts and skills and to update the curriculum to reflect current business needs and trends. Participants gained knowledge of telecommunications terminology and concepts while gaining skills in the use of modems, communications software and mainframe computers.

As a vital component in the learning-teaching system, teachers with telecommunications competencies can offer students learning experiences utilizing the latest in technology. Electronic communications network skills enable us to share and compare research data and ideas and enhance the vocational education curriculum.

TELECOMMUNICATIONS NETWORKS IN ACTION: AN INTERUNIVERSITY PROJECT

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In vocational education programs, teachers and students can benefit from electronic communications systems through collaborative classroom projects with other institutions. An example of such a project was conducted between the University of Idaho and the University of Nebraska-Lincoln (UNL) fall semester, 1990. In the project, students gained hands-on experience by using BITNET and Internet (wide-area networks) to exchange messages and search other institution's libraries. Participants gained knowledge of telecommunications terminology and concepts while gaining skills in the use of modems, communications software and mainframe computers.

Project Purpose and Objectives

The purposes of this collaborative project were to provide vocational education students with needed telecommunications concepts and skills and to update the curriculum to reflect current business needs and trends. Specific project objectives were learner-oriented and focused on providing students the means to:

- understand and use basic telecommunications terminology
- gain needed telecommunications competencies and skills
- understand and use telecomputing components: hardware and software
- communicate electronically and gain first-hand knowledge of the advantages and disadvantages of E-mail
- access and use a mainframe computer
- share ideas with other vocational education students
- explore telecommunications as a means for vocational teachers to enrich curriculum

This project was designed to insure that students gained experience using a mainframe computer (this was the only time in their programs in which they actually had an opportunity to use a mainframe) and learned about telecommunications through hands-on applications. The project was employed as an avenue to encourage students to examine electronic communication as a way to network with their colleagues and implement cooperative learning exercises within their own classroom settings in the future.

Description of Student Population

Eleven (11) students enrolled in an administrative office procedures class at the University of Idaho and seventeen (17) students in a business telecommunications class at the University of Nebraska, Lincoln participated in the project. These courses are required for business education and administrative office management students. The classes were composed primarily of third and fourth year students. Although the students from both universities did have experience using a personal computer, none of them had used a main-

frame computer, modem or communications software prior to the project. Students were enthusiastic (and perhaps a little apprehensive) about the project.

Procedures

The development and implementation of a project of this nature required the support of the university computer services departments as well as structured classroom discussions and demonstrations. Specifically, the following steps were taken to accomplish the objectives and goals of the project: 1) gain computer services support; 2) provide telecommunications background; 3) demonstrate and discuss telecomputing components; 4) demonstrate and discuss electronic mail (e-mail) applications; 5) demonstrate and discuss BITNET and Internet; and, 6) provide student assignment/transmission guidelines.

Gain Computer Services Support. To insure the project's successful outcome, support was elicited from the computer services departments at each university. Project directors consulted with their respective institutions' computer services departments to acquire computer mainframe time for their classes. Although each university has a policy concerning who has access to the mainframe(s), essentially that time is available to all students enrolled in colleges across campuses. Although BITNET and Internet are free to users of connected institutions' mainframes, specific university policies do differ in respect to student permission to use these networks. Some universities grant unlimited access to any enrolled student, while others limit access to graduate students, faculty and staff. The latter was the case for both the University of Idaho and the University of Nebraska; however, projects of this nature are encouraged and permission for student use was readily granted. Students were assigned user identification numbers and passwords.

Provide Telecommunications Background. For a unit dealing with electronic communication over wide area networks, students were introduced to basic definitions of telecommunications, networks, transmission media, mainframe (host computer), and telecomputing components. Concepts were discussed during class sessions utilizing as many visual aids as possible.

There are many telecommunications textbooks and resources available for use as reference aids (a partial list is contained in the bibliography).

Discuss and Demonstrate Telecomputing Components. Although students could access the mainframe directly through terminals on campus (and UNL students did use this medium on occasion), an objective of the project was for students to learn how to use a modem and communications software. Class discussion concerning the concept of telecomputing focused on the use of a modem and communications software to enable a personal computer to communicate with another computer through telephone lines. Communications software features and functions were demonstrated and explained. University of Idaho students used PROCOMM communications software (under $40.00), and University of Nebraska students used CONNECT (public domain communications software). There are a number of communications software programs available commercially and/or in the public domain, any of which would be suitable for a telecomputing project.

Students learned that protocol parameters must be set for successful communication to take place. For two computer systems to make sense out of the information they're exchanging with each other, there are certain aspects of the process that they must handle in a compatible way. The user is required to set the baud rate (modem transmission speed), parity, data bits, and echo. How do students know what those settings are? They must get the settings from the computer system (bulletin board, mainframe, etc.) with which they want to communicate.

Other features of communications software were explored and used. Students discovered how to operate a dialing directory, capture data, automatic dialing and redial, as well as download and upload files.

Discuss and Demonstrate Electronic Mail. Electronic mail is conceptually a simple application—the sending of a message from one person to another, but discussion also covered aspects of e™ mail including advantages and disadvantages. Although facsimile transmission was discussed as a form of electronic mail, this project concentrated primarily on communication between computers—telecomputing. The uses of e-mail in the workplace as well as the speed and cost advantages of the medium were reviewed. In support of using e-mail, the following research was discussed:

- 75 percent of all business calls are not completed on the first try
- 55 percent of all business communications are one way
- 76 percent of all business communications are not time sensitive
- 50 percent of a business call is not business-related
- 60 percent of all incoming calls are less important than the work they interrupt
- 90 percent of written phone messages are incomplete or garbled (Michigan Bell Telephone Company, 1988, p.2)

Although specific e-mail formats differ across software and hardware systems, the basic computer-based memorandum includes the same information contained in the traditional paper memorandum. Students were encouraged to compose and type messages in a factual and understandable manner resulting in a clear and effective message.

Discuss and Demonstrate BITNET and Internet. Background information on BITNET and Internet, network applications, and support services were examined during class time. BITNET, a wide area network, connects over a 600 colleges, universities, government agencies and private research organizations in the United States and around the world. BITNET, founded in 1981 by the City University of New York and Yale University, is one of the largest general purpose academic networks (Updegrove, Muffo, and Dunn, 1989). The BITNET information center which provides user services and administrative support, is administered by EDUCOM. In order to promote the use of BITNET in higher education, EDUCOM provides a number of services including an

on™line directory, paper and electronic newsletters, end-user documentation, workshops, publications, seminars, and conference presentations (Dyrenfurth & Mihalevich, 1986).

BITNET encompasses the NetNorth network in Canada and the EARN network in Europe. These combined networks include over 3,000 computer sides in Mexico, Canada, West Germany, Isreal, Japan, Korea and other countries around the world. Internet is an interlinked set of regional, national and international computer networks. Among the major networks in the Internet are NSFNET, ARPANET, and CSNET, but not BITNET.

Through the Internet, one may access remote computers, send electronic mail, obtain free software, and use the electronic catalogues of some of the nation's largest research libraries.

Although the following applications of BITNET and Internet were addressed in class discussions, time did not permit for students to attempt every application:

- send/receive electronic mail
- interactive messages (real time)
- file transfer
- discussion groups
- electronic magazines
- communicate with colleagues
- develop new contacts and network with colleagues
- instructional support (student/professor messaging, distribution of course assignments and materials, etc.)
- search library electronic catalogues
- download free software program

The project concentrated primarily on communicating with students through the sending and receiving e-mail.

Student Assignment/Transmission Guidelines. Computer services departments conducted the first session to acquaint the students with the logging on/off process, passwords and e-mail features. At this time, students sent messages to each other and worked their way through the process.

The next e-mail class exercise required that students log on and access the read mail option. They were pleasantly surprised to find a message from their instructor waiting for them. The message contained their day's assignment and asked them to respond to their mail and send messages to other class members. This gave them practice in accessing and generating computer messages prior to using BITNET. The University of Idaho students could go to a room containing a personal computer with a Hayes 2400 baud internal modem. The computer lab at the University of Nebraska had a 2400 baud external modem attached to one of the personal computers for student use.

Assignments were given which involved students sending and receiving three messages between Idaho and Nebraska. The students were to introduce themselves, ask questions, and/or give problems to their counterparts across the country. No other structured limits were given as to the actual content of student messages; however, messages received were to be printed and handed in. Ethics and etiquette for e-mail were also discussed in relation to the project assignments. Much of the ethics and etiquette problems associated with e-mail seem to stem from the lack of cues for readers. This can be attributed somewhat to the lack of clues, such as body language. Updegrove, Muffo, and Dunn (1989) provide guidelines for e-mail:

- Cover only one subject per message, which facilitates replies, forwarding, and filing.
- Use upper and lower case text because MESSAGES IN ALL CAPITAL LETTERS HAVE THE EFFECT OF SHOUTING.
- Be diplomatic. Criticism is always harsher when written, and electronic messages are easily forwarded.
- Be calm. You may have misinterpreted the implied criticism or missed the ironic humor in a message; don't send a reply while you are still hot under the collar. (Networkers call this "flaming")
- To signal your humorous intent, use the "sideways smile" :-).
- Don't use the academic networks for commercial or proprietary work.
- Be extremely careful about executing any programs that you receive over the network, since they may contain viruses that erases or damage your files or, by propagating themselves, disrupt the network.
- Don't send anything electronically that you wouldn't want to see on page one of The Chronicle of Higher Education. There is no assurance that a message you intend to be personal isn't being read routinely by a secretary or casually by a colleague or family member passing by a terminal.

In addition to the BITNET e-mail exercises, students used Internet to search the CARL libraries of Colorado and Wyoming and were encouraged to access other library systems and discussion groups.

Rewards, Difficulties and Frustrations. The primary difficulties associated with the project stemmed from problems with mainframe computers and computer services policies. For example, messages are retained on the University of Idaho system for only seven days; this was frustrating for students especially if they could not get in to check their mail often. The University of Nebraska, Lincoln computer services department shuts down the mainframe every Wednesday morning which was the class meeting time. Also, there were times when (because a student inadvertently touched the wrong keys) that a message would not send. Of course, the student would be unaware of this until after he/she had typed a "long" message.

One of the most frustrating elements was the lack of time since the project was initiated after the semester was in progress. Additionally, this telecommunications unit was only one segment within the course syllabus and assignments had to be proportioned accordingly.

Although there were difficulties and frustrations associated with the project, the project purposes and objectives were accomplished. Students gained needed telecommunications concepts and skills through hands-on application exercises. By using a modem and communications software to access the mainframe computer, they gained an understanding of telecomputing hardware and software components. Telecommunica-

tions terminology-™ networks, e-mail, online, real time, etc.—came alive and was not just something to read about. Additionally, perspective vocational teachers were able to explore telecommunications as a means of enriching curriculum within the classroom.

Student comments about the project were elicited as a means of evaluation. On the whole, they were very favorable and students acknowledged that they were ready to do more in the field of telecommunications. Some specific comments were:

- We didn't just read about it—we actually did it!
- This was the best part of the course.
- Can we still send messages to each other after the project is over?
- It isn't that hard! I thought using a modem would be more difficult. Now I can't wait to buy one for my computer.
- This is frustrating! I only wish we had a better mainframe system.

Summary

Would we do it again? YES! Through hands-on telecommunications applications, students are able to learn by experience. Active participative learning experiences enrich the curriculum and enable students to go beyond the classroom setting. Of course, as with any project, we would make some modifications. Initiating the project earlier in the semester would give students more time to "play" with the system and gain more experience using features of the communications software. Additionally, other activities such as conducting library searches, joining a discussion group and/or downloading software could be integrated into the project.

As a vital component in the learning-teaching system, teachers with telecommunications competencies can offer students learning experiences utilizing the latest in technology. Electronic communications network skills enable us to share and compare research data and ideas and enhance the vocational education curriculum.

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Electronic Mail, Conferencing, and Student Teaching

by
Paul E. Post

The project was designed to increase the communication between all the parties involved in the student teaching experience of students in the industrial technology education program at The Ohio State University. The project loaned each student teacher a laptop computer and provided the student teachers, cooperating teachers, and university supervisors with electronic mail accounts on the university mail system. The project had its first trial spring quarter of 1991 with seven student teachers in the field. A Ph. D. candidate used an action research design to collect data on the effectiveness of the system developed. Analysis of the data is currently underway.

The project had four major goals. First, to increase the communication between student teachers, cooperating teachers, and university supervisors. Second, to promote student's reflection upon critical incidents in their teaching. Third, develop a data bank of instructional materials for use by student teachers. Finally, to provide a forum for all involved in the industrial technology education program at OSU to help student teachers solve problems.

The hardware used by the university included the MAGNUS (Mail And Global News User System) system which is running on two DEC 5500 computers. The system has 64 megabytes of memory 4 gigabytes of disk storage and 64 phonelines. Student teachers were each loaned a Tandy IIOOFD laptop computer with 640 kilobytes of RAM, a single high density floppy disk drive, and a built-in 2400 baud modem. All the students had phonelines at home. The cooperating teachers shared their student's laptop or used a computer they already had. The computers used included, Apple IIs, Macintoshes, and IBMs. Some cooperating teachers had phone lines in their lab or their office, others had to go elsewhere in the building. The university supervisors used their office computers, Macintosh SEs with 4 megabytes of RAM and 20 - 45 megabyte harddisks. The computers are linked on an AppleTalk network and share a 2400 baud Shiva NetModem with its own phoneline.

The software used by the university included the Unix system, MAGNUS, MM and ELM mail systems, vi and fse editors, and the rn newsgroup reader. The students used Tandy DeskMate and ProComm. The cooperating teachers used the same software as the students plus a variety of other communication packages that they had. The university supervisors used White Knight.

The laptop computers arrived during the first week of school delaying orientation of the students until then. Students were first taught to use the DeskMate communication software and the MM mail system and the vi editor on MAGNUS. That proving cumbersome ProComm was obtained and the student were taught to use it and the ELM mail system and full screen editor (fse) on MAGNUS. Midway through the quarter they were introduced to rn and the use of newsgroups.

Five mail lists were created to make mailing messages to groups of users easier. STEACH - sent mail to all student teachers. COOPS - sent mail to all the cooperating teachers. USUP - sent mail to all the university supervisors. INFAC - sent mail to all the industrial technology education program faculty. INTEC - sent mail to all of the above.

The students were required to complete a number of assignments to insure their usage of electronic mail. They were required to respond to all questions from the university supervisors. Each was to send two message a week for the first two weeks to STEACH. Each student was also required to post at least one critical incident report each week.

During the quarter it was observed that the greatest amount of communication developed between the student teachers and the university supervisors. There were some requests for lesson information that drew responses from all involved groups. Student teachers appeared to increase their reflection on the critical incidents in their teaching, or at least the university supervisors knew more about it. Large differences in student usage of electronic mail did not seem to be linked to past observation of student classroom behavior. Some of the students who used electronic mail the most seemed to be the quietest ones in classroom discussions.

The following recommendations are suggested on the basis of observation since the data analysis has not been completed. The students need to be oriented to the electronic mail system before the start of student teaching and more time spent on developing their file transmission abilities. Increasing the number of reflective questions asked of student teachers may help to increase the reflection upon their experiences as might having students keep their daily log on-line. Learning may also be enhanced by involving others such as students who are not currently student teaching and university faculty not supervising student teachers. The on-line involvement of the cooperating teachers needs to be increased by including them in more questions. The system also makes it possible to conduct a weekly three-way conference with each student teacher and cooperating teacher team. Also more feedback to the cooperating teachers on their performance should be provided.

Overall the project was successful and did increase the amount of communication between student teachers, cooperating teachers, and university supervisors. The industrial technology education program has already begun teaching about electronic mail in a number of pre-student teaching courses and in the fall will add the topic to the program's methods courses. The student teachers, cooperating teachers, and university supervisors all commented quite favorably on the use of electronic mail as a means of improving communication.

A Focus Group Report on Religious On-Line Education

by
James Terry Roberson, Jr.

Executive Summary

The technology of the Information Age profoundly affects the rate at which information is gathered and disseminated. In consequence, society is being transformed with respect to the way things are done. The Black community is beginning to feel the effects of, and is slowly acclimating itself to this trend. The church, as one of society's primary institutions, is feeling the impact of this revolutionary shift. Nevertheless, the African American Church has been essentially unconscious of the challenges of the Information Age. The purpose of this study is to focus on the African American Church and its appropriation of technology for ministry in the 21st century. The general objective of the study is to raise the level of theological education within the Black Church by showing a practical use of the technology of the Information Age.

In Phase One of this study, a series of online focus groups were established on the BRSNET network to ascertain the perspectives on theological educators of Black Religious Studies on in the Black Church. These discussions were focused on whether Computer- Mediated Communications could be adopted as a resource for Distance Education pedagogy in order to enlarge and strengthen theological education in the African American Church and community.

This phase of the study has demonstrated the technical feasibility of Distance Education using Computer-Mediated Communications on the Black Religious Studies Network. This phase has also demonstrated online focus groups on BRSNET as an economical way of doing research on particular problems within the Black Church.

A recommendation is made to proceed to the next phase of the Religious On-Line Education (ROLE) project. This next phase would pilot an online course in the Central Hudson Baptist Association of New York. The syllabus derived from this phase is to be used for the pilot course.

The writer wishes to thank the following organizations for their direct participation in this study:

1. The Society for the Study of Black Religion.
2. The Empire Missionary Baptist State Convention.
3. The Central Hudson Baptist Association.
4. The Interdenominational Theological Center.
5. Howard University School of Divinity.
6. New York Theological Seminary.
7. Payne Theological Seminary.

Lastly, I wish to thank Dr. Gayraud S. Wilmore for his mentoring and encouragement in this project.

Purpose of the Study

The technology of the Information Age profoundly affects the rate at which information is gathered and disseminated (Cetron, Rocha and Luckin 1988; Naisbitt 1984; Toffler 1980). In consequence, society is being transformed in terms of how things are done (Ferguson 1980; Naisbitt 1984). The African American community is beginning to feel the effects of, and is slowly acclimating itself to this trend (Jaynes and Williams 1989). The church, as one of society's primary institutions, is feeling the impact of this revolutionary shift (Davis and Clapp 1983; Lochhead 1988; Bedell and Rossman 1984; Rossman 1985). Nevertheless, the Black Church has been essentially unconscious of this shift, slowly becoming ineffective in responding to the challenges of the Information Age.

The purpose of this study is to focus on the African American Church in anticipation of its appropriation of technology for ministry in the 21st century. The general objective of the study is to raise the level of theological education within the Black Church by showing a pragmatic use of the technology of the Information Age.

The Research Questions

Key question being looked at in this study is "Can computer conferencing be used as a pedagogy for theological education and scholarly research and collaboration within the Black Church?" Some other questions being looked at are: What are the inhibitors to theological education in the Black Church? Will Black Religious Studies educators accept this method of delivery as practicable and credible? How will educators be prepared to use this technology if it is acceptable? What are the inhibitors to the acceptance of this technology in the Black Church and the academy?

The Research Design

ROLE project is designed to use the modern facilities of Computer-Mediated Communications and Distance Education to conduct theological education classes in the Black Church at the local congregation level. To cope with the turbulent setting of evaluation projects, Carol Weiss, draws from the work of Edward A. Suchman to propose a four phased approach to evaluation projects. This project is being designed and imple-

mented on the Black Religious Studies NETwork (BRSNET) and is divided into four phases as follow:

1. Pre-pilot Phase.
   Phase One engages educators of African American Religious Studies in an evaluation of the concept of online education as a potential pedagogy for theological education in the Black Church. This phase uses focus groups as a qualitative research method to explore the phenomenon of online education in the Black Church and has already served to raise collateral issues/questions concerning the nature of Black theological studies heretofore unexamined by religious scholars. This phase is also designed to teach the teachers about the nuances of online education. Data from this pre-pilot phase will be used as input to the pilot phase and also for triangulation purposes.
2. Pilot Phase
   Phase Two will engage pastors of local Black congregations in a pilot class on the BRSNET network. This phase will be an evaluation research project using qualitative inquiry methods. The Central Hudson Baptist Association of New York will be used as a sample frame. The specifics of this phase will be determined after data collection and analysis of Phase One.
3. Prototype Phase
   Phase Three will develop a prototype model of the general availability on the network of courses pertinent to African American Religious Studies. The objective of this phase will be to subject the model to realistic operating conditions. This phase will also seek to influence seminary and university programs to better accommodate theological education within the Black Church. This phase will use the Empire Baptist Missionary State Convention as a sample frame.
4. Institutionalization Phase
   Phase Four will be devoted to institutionalization of the model into the structure of the Black Church. During this phase, efforts will be made to make this offering an ongoing part of the Black Church. Using the definition of C. Eric Lincoln, an appeal will be made through the national offices of the seven denominations that constitute the greater part of the African American Church in the U.S.

The remainder of this report focuses on Phase One, its methods, its findings, and its conclusions.

Phase One: The object of this phase is to expose the prospective online teachers to the technology and to have them evaluate the potential of this technology for theological education within the Black Church. Accordingly, several members of the Society for the Study of Black Religion (SSBR) were contacted and requested to acquire the necessary hardware and software and to join in this on-line project (in most cases, all that was needed was a modem). This phase of the project started in June 1990 and ran through August 1990.

Phase One Methodology: Jane Templeton defines a focus group as "a small, temporary community formed for the purpose of the collaborative enterprise of discovery." She further sees focus groups as a group method of exploration in the search for marketplace truths. While this form of qualitative research methodology has been used almost exclusively for marketing research, focus groups are increasingly being used by researchers as a self contained means of collecting data and as a supplement to both quantitative and qualitative methods. This phase uses a focus group as qualitative research device instrumentality to explore the feasibility of using Computer-Mediated Communications or computer conferencing as a pedagogy for theological education within the Black Church. This phase is being implemented as an online class in which the prospective teachers of online African American Religious Studies temporarily become students. It is believed by this writer that these instructors will have a better appreciation for the problems and frustrations of the student if they have experienced a class online themselves.

The structure of the Religious On-Line Education class was to have an online focus group meeting that would serve as the ROLE root meeting for this project. Several sub-meetings were initiated under the root meeting. The participants of the ROLE focus group were as follows:

J. T. Roberson, Moderator and Researcher. Dr. Paul Levinson, Co-moderator and Consultant.

The invited participants were:

1. Dr. Randy Bailey, ITC, Atlanta, GA.
2. Dr. James Evans, CRDS, Rochester, NY
3. Dr. John Diamond, ITC, Atlanta, GA.
4. Dr. Jacquelyn Grant, ITC, Atlanta, GA.
5. Dr. John Kampen, Payne, Wilberforce, OH.
6. Rev. J. Edward Lewis, NYTS, New York, NY.
7. Dr. Miles Jones, VUU, Richmond, VA.
8. Dr. Henry H. Mitchell, ITC (VUU/UTS), Atlanta, GA.
9. Dr. Larry Murphy, Garrett, Evanston, IL.
10. Dr. Lawrence Mamiya, Vasser, Poughkeepsie, NY.
11. Dr. C. Geno Newsome, HUSD, Washington, D.C.
12. Dr. David Shannon, ITC, Atlanta, GA.
13. Rev. Allen Stanley, Empire State Convention, Troy, NY.
14. Dr. Sherman Tribble, Star Baptist Church, Ossining, NY.
15. Dr. Gayraud Wilmore, ITC, Atlanta, GA.

In addition, several people on the ECUNET network were invited to monitor this study and offer comments directly to the researcher.

As moderator of the meetings, my objective was to start the meetings with a brief introduction to the problem in the form of an open-ended question. The group would then determine the direction of the discussion. It is necessary that a high level of homogeneity exists in a focus group. Most of the persons in this group are members of the SSBR and are therefore, interested in research in African American or Black Religion. The general sequence of the meetings was as follows:

1. General discussion and getting acquainted with the network via discussions in ROLE CHAT.
2. A discussion of the problem in ROLE PROBLEM.
3. A look at computer conferencing as a potential solution to the problem in ROLE TECHNOLOGY.
4. A closing discussion on approaches to using this technology. This discussion included any final reflections and conclusions.

The asynchronous character of Computer-Mediated Communications allows the user to conduct a meaningful interactive dialogue without regard to time and space. This facility created an on- going forum in which users could log on at their convenience and participate in the dialogue. Meetings were opened as necessary to get discussions started. Initially, only ROLE, ROLE CHAT, and ROLE DESCRIPTION were started on June 14, 1990. A few weeks later, June 25, 1990, ROLE PROBLEM was opened. After several weeks of discussion in ROLE PROBLEM, the discussion was moved on to ROLE TECHNOLOGY. ROLE TECHNOLOGY was open on July 10, 1990 and ran through to the beginning of September, 1990. Final reflections and remarks were requested in mid-September.

The Results

The results can be summarized in three sections. First, the general comments that were found in ROLE and ROLE CHAT were of a technical nature. Next, the conversation in ROLE PROBLEM focused on the question "What is the essential problem with raising the level of theological education within the Black Church?" Finally, the discussion in ROLE TECHNOLOGY proposed an answer to the question "How can this technology be used as a pedagogy for theological education in the Black Church?"

ROLE CHAT

ROLE CHAT was a general purpose meeting designed to allow participants the opportunity to discuss problems they encountered getting onto the system. Of the 15 participants invited, three (3) were not able to get on the system because of other commitments. Two of the participants had hardware difficulty but they managed to get on. The remaining ten (10) were able to get onto the network using the instructions found in the BRSNET User's Guide. There were three areas of concern discussed in this meeting. They were hardware problems, navigating the BRSNET network, (particularly uploading and downloading) and lastly, using an editor program to read and modify messages for upload/download.

Hardware Concerns

All the concerns for hardware were with the modem. In at least one case, there was an actual hardware problem and the modem had to be returned. All the other problems were a matter of adjusting the parameters in the communications software to match the hardware configuration. The most common problems involved the communications port (COM1 vs. COM2) and incorrect data rate settings (2400 bps set for a 1200 bps modem). Another common problem was using a "tone" dialing command on a "pulse" line. Generally, a telephone conversation was sufficient to resolve these problems.

Navigating the system

I participants were issued a BRSNET User's Guide. This exercise was also a test of its usability. Most participants were able to get onto BRSNET with the instructions provided in the User's Guide. Participants were required to log on, enter a message online and send the message to the moderator and the ROLE CHAT meeting. They were also required to download the contents of ROLE DESCRIPTION. All participants were able to get online and enter a message online. Many of the participants expressed having some difficulty with the upload and download feature; however, most were able to complete the assignment. The difficulty encountered in this area has suggested some modifications in the upload/download section of the BRSNET User's Guide. Participants were able to achieve effective communications after a few attempts with upload/download.

The Editor Program

To create messages off-line for uploading and also to modify/edit messages that have been downloaded, an editor program is required. Most of the participants used WordPerfect. In preparing a message for uploading, the ASCII file option of WordPerfect (Alt-F5, 1, 1) was used. The one problem encountered was confusion of the sub- directories. The communications software (PROCOMM) and the editor (WORD PERFECT) were in different sub-directories. This sometimes caused the user problems in not being able to get to the downloaded message from WordPerfect. Most of these problems were resolved over the telephone.

ROLE PROBLEM

The conversation in this meeting was opened with a brief discussion on the evolving nature of the African American community and the growing demand for theologically trained clergy. A new outreach approach was called for which was characterized as a "seminary without walls." The conversation immediately jumped to the perceived cleavage between "academic types" and "pastor types." Suggestions were made that seminaries should "retool in light of our particular needs." There was much discussion on this subject and possible items of agreement on this subject were:

- A holistic interdisciplinary approach to religious studies in the Black or African American tradition is essential as a hermeneutical base for theological education within the Black Church, both at the theoretical and practical level.
- Most pastors want to do and be better than they are. Unfortunately, we have not found the best method for reaching and instructing them.
- Special attention must be devoted to the "pastors without degrees." This population seems primed for Distance Education.

- There must be an appreciation of the gifts of both "academic" as well as "pastoral" that lack the air of "anti- intellectualism" sometimes seen in Black Religious Education.

The general conclusion drawn from this dialogue was that a program should be put in place that brings academics in touch with the practitioners in a manner that promotes the contributions of both. Such a program must be interdisciplinary and must appeal to non-college pastors as well as academics. To raise the level of theological education in the Black Church, a program must be developed that reaches outside of the seminary and into the local congregations.

ROLE TECHNOLOGY

The opening note in this meeting was done by Paul Levinson. Paul provided a provocative opener to get the discussion started by referring to the computer as an "equalizer" between teacher and student. The relationship between teacher and student in this environment is not the teacher in front of the students but rather the teacher "among" the students. Paul spoke from the pedagogical experiences he has acquired using this technology at Connected Education. There was a rich dialogue in this meeting and much material was discussed.

The conversation immediately proceeded to practical concerns with this technology. Such questions as when should a student upload/download, how long should a response be, how soon should the instructor insist on a response, when should the instructor insist on a response, etc . . . were posed. Several comments were put forward concerning the first time use of this technology, whether it is wise to initiate a class of this nature with a fact- to-face meeting, etc . . .

Participants raised questions of how the classroom dialogue would be implemented in this environment. The question of confidentiality was raised. Such things as tests and examinations, teaching methodology, class structure, mixing of online education with conventional in-person education were discussed. Thought was given to the potential of this technology for enhancing continuing education programs. Suggestions were made regarding enhancing current DMin. programs with online supplements.

We reviewed a report from a student involved in an online class for graduate credits. This report from the Boise State University program was quite valuable in getting a different perspective on the use of computer technology as the basis of a new pedagogy in theological education.

After approximately two months of online discussion, and some telephone conversations, we were able to evolve a syllabus for a proposed fall course online. The following structure is proposed:

- The first course to be offered should be "Introduction to African American Religious Studies (AARS)." The course will use team teaching and the professors will monitor each module for interdisciplinary opportunities. The modules for this course, along with the proposed instructors are as follows:

  Introduction, Wilmore and Roberson
  Biblical Studies module, Bailey
  Historical Studies module, Murphy
  Theological Studies module, Grant
  Ministry Studies module, Mitchell

- The method of delivery will follow two approaches:
  - The remote facilitator approach in which a theologically trained individual would use the curriculum developed by the interdisciplinary teaching team at a local congregation. The Mount Lebanon Baptist Church of Peekskill, NY was selected as a case study site to examine this approach in the context of the Black Church. This site was recommended because of Roberson's heavy involvement with this church and the expressed willingness of the congregation.
  - The completely online approach should be tried with several pastors within a given geographic area. The Central Hudson Baptist Association of New York was recommended. This group was recommended because of heavy Roberson involvement and also because of the 45 churches, of which approximately 50 % have access to a computer already.
- For the completely online class, the first and last class meeting should be face-to-face. This option is being used because of the convenience of getting all the students together. Also, the pilot nature of this course suggests we should go with the face-to-face meeting.
- The Electronic week is to start on Wednesday and end on the following Tuesday. This should give pastors the weekend for their normal pastoral responsibilities.
- Tests and Examination:
  Students will be required to make a two-screen maximum response to the opening meetings. Students will also be required to respond to each other's reaction. The purpose of this requirement is to ensure healthy dialogue among the students. The final exam will be a 10 page double spaced reflection paper submitted to Roberson online.
- Class credits.
  The New York Theological Seminary will work with Roberson to grant Continuing Education Unit credits for this class. Based on a planned 30 contact hour curriculum, three CEU credits will be granted.

The conclusion drawn from this dialogue was that we could conduct a class on the network in African American Religious Studies. The syllabus for the proposed class can be seen in Appendix B.

LIMITATIONS

During the discussions, two areas were pointed out as having serious limitation factors. These areas were of economic and psychological concerns.

Economic Concerns

Several of the participants raised questions about the prerequisites for participation in this kind of course. The one obvious fact is that one must have a computer and modem. Given the socio-economic status of most Black people, can they afford this program? The answer has

to do with personal priorities rather than economics. In today's environment, a computer system can be purchased for less than a component stereo system. The question now becomes "Is a stereo system more important to me than a computer?" Another point to note regarding the required system has to do with future projections. Futurists have suggested that by the year 2000, eighty percent of all households will have a computer. It is therefore reasonable to expect that while system availability may pose a problem now, this will not be the case by the year 2000.

Technophobia

The psychological problem of using this equipment is more difficult to deal with. The very high presence of "technophobia" is an undeniable fact within this community. Our experience in the Computer Literacy Into our Community (CLIC) project has demonstrated that this problem can be dealt with; however, it takes time. The CLIC project has demonstrated that members from the African American community will engage this technology much more readily in a church environment. It is believed that the strong faith dimension within this community, combined with the non-offensive environment of the church works as powerful tools to combat the effects of technophobia.

Paradigm Shift

Using the works of Thomas S. Kuhn and Adam Smith, Joel Barker defines a paradigm as "...a set of rules and regulations that: 1) defines boundaries; and 2) tells you what to do to be successful within those boundaries." And he adds "A paradigm, in a sense, tells you that there is a game, what the game is, and how to play it successfully." Barker then defines a paradigm shift as ". . . a change to a new game, a new set of rules." The evolving demographics of the college campus, with more adult learners present, is having a profound affect on curriculum. Continuing Education programs, Distant Learners and Adult Learners are becoming more the norm. Computer-Mediated Communications offers great potential in Distance Education as a meaningful delivery mechanism for a new pedagogy. Distance Education using Computer- Mediated Communications provides an environment that is conducive to the work schedules of the adult learner.

According to Barker, Kuhn writes that when a critical mass of unresolved problems creates enough uneasiness within a community, certain kinds of people are going to search for a new paradigm to replace their existing and now dysfunctional set of assumptions. The change in campus demographics, along with trends in Distance Education, trends in the technology of the Information Age combined with the problems of theological education within the Black Church all point to what Barker, Kuhn, and Smith have alluded to as a paradigm shift. The old paradigm that has kept the "pastor types" separated from the "academic types" is no longer acceptable. The technological trends sweeping the society in general and the African American community in particular, are demanding a new game, a new set of rules. Dr. Miles Jones is right on target when he suggests ". . . this might mean that Black seminaries will be required to re-tool in light of our own particular needs."

This writer shares the idea that Computer-Mediated Communications will shortly emerge as a new educational paradigm, taking its place alongside face-to-face education. This technology is especially appropriate for theological education because of the reflective dimension of theological education.

Conclusions and Recommendations

This study has demonstrated the feasibility of online education in the Black community. It has shown that, at least from the perspective of the educators and with the proper support, online education appears to be a viable alternative to traditional education in addressing the problem of preparing ministers for the Black Church. Most technical user problems can be handled over the telephone and users can become reasonably proficient on the system without face-to-face contact and in a short period of time. Even though economics is a concern, it is the opinion of this writer that this problem will be minimal or non-existent by the year 2000. The technophobia concern is more serious and must be dealt with meticulously. The strong faith dimension, however, can be used very effectively to combat this fear.

Based on the dialogue of this study, a syllabus has been developed, which is highly recommended for Phase Two of the ROLE project. A proposal has been made to the Central Hudson Baptist Association and this group has agreed to be the venue for the Pilot Phase of the ROLE project. The Mount Lebanon Baptist Church of Peekskill, NY, has also agreed to be a pilot site for this study.

Given the positive results of this Pre-Pilot Phase and the commitments attained from the various organizations, this project is moving into Phase Two.

Online Focus Groups

As a corollary, the use of online focus groups has proven to be a very efficient and effective way of getting a small group to focus on a particular problem. Focus groups have made significant strides in becoming useful for exploratory research where relatively little is known about the phenomenon of interest. The unique combination of Focus Group research and Computer-Mediated Communications have given rise to the Online Focus Group. This project has brought together some of the leading minds on Black Religious Studies along with experts in online communications to produce a valuable work and at a relatively small cost. It is highly recommended that this method of qualitative inquiry be used more often to focus specialized attention on problems and issues within the Black Church and the African American community.

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Research and Development Activities Regarding Opportunities and Problems with Computer Conferencing for Rural America

by
Dr. Ronald M. Stammen

Futurists predict that the education systems of tomorrow will be drastically different from those of today. They forecast that current information about teaching and learning will proliferate and will be used more effectively because of educational technology and telecommunications. However, they add that it might take a century to bring to bear the applications of the knowledge base that is now in its genesis stage. After all, they emphasize, it took a century for our nation to develop a super highway and transportation infrastructure to support the automobile industry that evolved concurrently (Stammen, 1991).

The following summarizes the research regarding rural school administrative usage and perspective of computer conferencing in eastern Montana, northern South Dakota, North Dakota, and western Minnesota:

1. Typically, an experienced rural school administrator does not use computers for communicating long distances and has no knowledge about advanced computer conferencing capabilities. There is some familiarity with bulletin boards and electronic mail, but it is not being used for instructional or administrative purposes.
2. A typical rural school administrator agrees with over half of the problems or barriers current literature says impede the usage of computer conferencing technologies in schools. The following describes these typical concern:

a. **Equity concerns** of these rural school administrators agree that subject -matter experts are not available in their rural communities. They feel computer conferencing will help with this as well as with the problem of not being able to interact with career role models. They also have a desire to use this medium for interaction and joint activities with peers in other locations. They suggest this technology will help with acquiring needed additional resources for information and instruction. Finally, they agree it would provide additional staff development courses, equity of educational opportunity, and equal access to increase quality of information services.

b. **Infrastructure requirements** for rural schools are adequate, but school administrators do feel it is somewhat of a barrier that many rural telephone companies lack a system with equalized capability and service. Two-thirds of the rural telephone companies provide digital switches and high-quality transmission lines for reliable data transmission. Fiber optics is installed in half of the rural areas included in this study.

c. **Financial aspects** would not be a barrier for school administrators if they knew computer conferencing was cost effective; however, they indicate that financial support is not available for computer conferencing equipment and to cover long-distance charges. Budget cuts and constraints have prevented previous usage.

d. **Consortia and Cooperatives** provide ways for area rural schools to develop long-range strategic plans to use computer conferencing. The school administrators indicated that a cluster of cooperating schools are ideal for developing an administrative network for state and local communications needs.

e. **Regulations and policy** problems affecting rural schools are issues not being dealt with by either national or individual state leadership groups who should be interested in changing policy in favor of education. There is a need for collaboration among administrators regarding such regulations for using technologies like computer conferencing. School administrators agree that Congress must review and shape policies to reflect the nation's educational needs in light of the possibilities created by new computer conferencing technologies. They also feel policy makers at all levels of government are not giving enough attention to expanding the amount and capability of computer conferencing technology in schools.

f. **Users' interest** statements found that rural school administrators have a desire to use computer conferencing for instructional and administrative purposes. Half of these respondents lacked computer-accessing skills needed for searching and retrieving information on-line with a computer. They believe it can be a part of their daily style and routine. They have the ability and keyboarding skills necessary to use this medium effectively, yet they admit, overwhelmingly, that school districts do not have clear goals for using technologies such as computer conferencing.

g. **Socio-technical aspects** pose many barriers for the rural school administrators to contend with as leaders in the transition toward utilization of telecommunication technologies. These administrators agree the knowledge explosion is too much for anyone to handle without assistance of long-

distance telecommunication technology. They also admit educators are reluctant to learn because of computer anxiety. They agree teachers are reluctant to become technologists in addition to being educational professionals. They disagree that computer networking skills should be taught in vocational education courses and that computer conferencing is becoming one of the needs of the workplace.

h. **To educators**, "educational technology" implies devices, not the process approach to instructional development. Administrators realize they have to break down the barriers that make many educators feel compelled by powerful social and administrative pressure to teach in particular ways which limit their opportunity to utilize computers. They agreed it is necessary to lead in changing the perception that computers are "another" technology rather than a mode that extends an educator's capacity to help people.

i. **Management and leadership** problems appear nonexistent among the administrators surveyed. Although the majority felt they should utilize computer conferencing for state and local purposes, they overwhelmingly rejected the notion to develop such skills for nationwide communication needs. However, most everyone agreed that they should provide teachers with the opportunity to expand their thinking about use for instructional purposes.

j. **Time consideration** poses problems and creates barriers for implementing technologies in rural schools. A typical rural school administrator admits there is a lack of time for proper training of people to use computers. Turnaround time and timely feedback for exchanging information is a problem. These administrators contend they do not have time to explore and implement computer conferencing networks.

k. **Support Resources** involve barriers for rural schools because they lack sufficient support personnel to properly utilize computer conferencing. The administrators agreed that resources are not used properly to train people in how to use the computers. Personnel are just not available in rural areas to help explore educators' creative capabilities with computer conferencing.

l. **Access Issues** involve such concerns as having a dedicated telephone line in each of the school buildings and access to computer conferencing services. The school administrators admit it is a barrier that rural areas have inequitable access to telephone services, and desire access to competitive long-distance carriers.

There is a keen interest among rural school administrators to develop these telecommunication links to enhance curriculum and support added instructional opportunity for students. These school administrators tend to perceive this medium for instruction rather than administrative purposes. Yet the findings suggest there is much interest to develop projects which organize networks between administrators who are involved in consortia or cooperative activities.

The research shows that rural administrators are faced with a majority of the problems and barriers the literature suggests occurs throughout the nation.

The fact that funding is a concern and most school districts lack proper goals to use new communication technologies in education suggests diffusion of new projects will occur slowly during the next few years. However, indications that diffusion will occur are evident because administrators place a high priority on eliminating equity-and-access barriers in rural areas with telecommunications. Rural school administrators recognize the need to help expand their teachers' thinking toward change, adaptation, and implementation of telecommunication projects. These administrators admit they have much to learn. They lack time for proper implementation, but appear to be committed to start using these technologies. This could occur faster when or if they were trained to the extent that they could obtain the skills to make computer conferencing cost effective. The infrastructure for telecommunication appears to be in place for these rural areas to utilize these opportunities.

The findings suggest that if the school administrators would become involved in utilizing communication networks via computer conferencing, they might also become more involved in urging policy makers on the state and national levels to give education more attention regarding related regulations and policies.

The findings also show that leaders have much to do to help associates overcome the barriers involved with computer anxiety. This includes helping eliminate the reluctance of educators to be involved as technologists, and accepting technology as a process approach to instructional development. This also implies the need for administrators to set the tone so educators do not limit their opportunity to use computers when it is more expedient and effective to enhance the delivery of education.

Finally, this study found that school administrators wholeheartedly agree that the knowledge explosion is too much for any one person to handle without assistance from telecommunication technology. Therefore, even though minimal utilization of computer conferencing was detected, the existence of the IRIS project in Minnesota and the EDUNET service in Montana reveals the seeds are sown for long-range development for instructional and administrative purposes. The upsurge of consortia and cooperatives created to support these rural activities suggests that much involvement should occur in all aspects of telecommunications. This movement is exactly what the literature predicted will happen while projecting an increasing need for rural school administrators to collaborate and coordinate through computer conferencing. The administrators responding to this study concur.

The following abstract describes a grant proposal named SEND-IT. It developed in October utilizing the data from this research completed in August, 1990. It was subsequently approved for a $200,000 pilot project by the North Dakota Telecommunication Council in

November, 1991 using funds from the $4 million appropriated during the 1989-1990 legislative period. The state legislature has appropriated another $5.1 million to further develop the educational telecommunication infrastructure within the state Most of these funds will be utilized to complete the telecommunications technologies infrastructure for secondary schools regarding interactive television. However, $400,000 has been budgeted to extend SEND-IT throughout the state by 1993.

The SEND-IT Pilot Project Team Members

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Abstract

K-12-UNIVERSITY COMPUTER TELECOMMUNICATION FORUMS

The purpose of the SEND-IT project is to use the capacity of the Higher Education Computer Network (HECN) to enhance instructional conferencing and coordination between K-12 school districts in North Dakota.

The initial application was a pilot project between school districts of the SEND Consortium in southeastern North Dakota and North Dakota State University. An experimental component would reach out to an extreme remote cluster of the Northwest Telecommunication Consortium in Region 1.

This project complemented endeavors of the Governors' Gifted and Talented Mentorship Program and the Department of Public Instruction's Talented and Gifted Center both of which are also based in Fargo, North Dakota. These centers of activity could provided demonstration support, as well as resources for this pilot project.

The project is designed to meet the following objectives:

1. Facilitate use of the computer to network between the students and teachers of different North Dakota School Districts. A special emphasis will be to enhance within and across academic disciplines.
2. Encourage use of the computer by students and teachers within K-12 districts to draw information from the North Dakota Information Network.
3. Encourage use of the computer by students, teachers, and support personnel to tap national and global networks (both academic and private sector) for information that enhances student learning.

The secondary objectives will be to increase interaction between university faculty and K-12 instruction and individual students, as well as increase interaction between NDSU School of Education, Computer Center, and K-12 districts of North Dakota.

Background of the Project

Responsibility for operation of this project rests with the School

of Education (academic application) and Computer Center (technology application) of North Dakota State University. The responsibility for the operation of the technology rests with the North Dakota Higher Education Computer Network (ND-HECN) at North Dakota State University which is also located at Fargo. The North Dakota Information Network (NDIN) is a system of communications lines that is jointly funded and managed by the HECN which represents all state supported institutions of higher education and the Information System Division (ISD) which represents all state agencies.

The representatives from NDIN a proposal pending with the National Science Foundation (NSF) requesting funds to enhance the capabilities of the network. One of the major emphasis of the proposal was to point out the value of the network to other agencies such as the Department of Public Instruction, Indian Schools, and other related agencies. This proposal utilizes this network, to substantially reduce the communication costs from the school districts to the host computer and to Internet with the computer communication protocol termed TCP/IP At least one computer and modem will also be located at each remote site to assure a necessary level of interaction.

The services of this network would improve the capability of the K-12 schools to deal with the instructional problems which they have faced alone or by attending travel intensive conferences and consortia.

NDSU houses the K-12 host computer, server, and communication equipment and technical expertise needed to operate the equipment that would link the K-12 schools to each other. NDSU has professional expertise in the School of Education to organize and provide the training necessary for instructors. They are also in a position to coordinate support personnel of the K-12 SEND districts to help use this equipment to improve the learning of the participating schools.

The SEND Districts enroll twenty-five per cent of the entire K-12 student body of North Dakota. The higher education institutions at Fargo, Mayville, Valley City, and Wahpeton are members of SEND. The Universities or colleges located at these cities, along with the state institution at Jamestown were to be supplemented with extra telephone ports to handle the increased traffic accessing HECN's dedicated server for the secondary schools in this project. However, 800-toll numbers are being used until the entire HECN is restructured under the NSF grant. Students have access to the library services of PALS at North Dakota State University which has access to the Minnesota Higher Education library system through its Tri-College University connection and ODIN a North Dakota Library system managed at the University of North Dakota in Grand Forks..

Networking between the students and teachers of geographically isolated schools through computers has proven to be an increasingly popular and cost effective approach to improving instructional opportunities of K-12 students. The National Science Foundation is en-

couraging school-college interactions which take place electronically to promote counseling, curriculum enhancement, admission questions, financial aid questions, and teacher in-service or staff development

The key to successful introduction of such technology has been to jointly plan activities with all parties involved in the project. A two day workshop trained the cluster trainers from each region who in turn, trained building trainers of the schools within these clusters. These activities adequately trained and supported the teachers and students who are the primary users of the system.

Follow up workshops for the cluster trainers will be taking place in June and July, 1991. On line discussions continue to reinforce the training, along with a print-base monthly newsletter which serves as a documentation source.

The statistics gathered to assess the progress include users, new users, sessions, time used, and whether teachers, students, or staff logged in the system.

The long-term prospects of this system would include expand the networking capabilities to all North Dakota School Districts and Higher Education Institutions. The proposal for replicating the project to another third of the state was approved June 3, 1991 along with tentative plans to complete the final third during the 1992-1993 school year.

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Examining Computer Conferencing As A Technique For Enhancing Personnel Development Activities

by

Robert M. Torres, Wes Budke, Michael Loyd, N.L. McCaslin and A.J. Miller

Vocational teachers are facing rapid changes in both the knowledge base and technology available to them as they prepare young people and adults for employment in the twenty-first century. Centron and Davies (1989) suggested that our present level of technical knowledge will represent only one percent of the knowledge that will be available in 2050. Additionally, technological advances such as computers, lasers, and robots will open many new avenues for enhancing teaching.

Naisbitt and Aburdene (1990) state that this type of technology will empower individuals by making information readily available to them.The types of changes described above will have a dramatic impact on the way in-service education is delivered.

Congress has also addressed legislation to provide financial resources for improving the educational technology and staff development in our schools (Knauth, 1989; West, 1989).

One way of supplementing and enhancing in-service programs is through the use of computer conferencing—involving the use of both computers and telecommunications.

Norton and Stammen (1990) stated:

> Computer conferencing allows students to enjoy an interactive classroom environment without having to leave home or work. Face-to-face classroom discussions are recreated on computer terminals. Communication devices called modems allow the course instructor and student to talk to each other electronically over telephone lines. The lecture portions of a course are replaced by individualized competency-based packets of materials students read and study at their own pace.
>
> Throughout the course, the instructor initiates and facilitates discussions by computer with one student or with a group of students, depending on what they are studying. At the end, students are given either a written or real world performance test. (p.26)

Additionally, they describe computer conferencing as an innovative form of in™service training that addresses many problems vocational teachers and administrators face when courses are taken to stay informed about their fields.

Barriers such as demands of work and family or long commutes to class that inhibit vocational teachers' and administrators' ability to stay abreast in their area can be overcome through the use of computer conferencing. Roberts (1987), examined distance education to determine the interactive capabilities of the computer, namely electronic mail and conferencing.

Roberts concluded that computer conferencing can extend many of the learning opportunities of the classroom to distance and independent study.

Additionally, it was felt that course delivery exclusively by computer is not only feasible, but an exciting alternative pedagogy.

Advantages reported by Roberts were that teaching by conferencing overcomes the most serious disadvantage of independent and distance learning: It breaks down the isolation of the student from peers. It also permits the student to benefit from the shared experience of a group engaged in the same study and the opportunity to measure his or her ideas against those of other students in the class.

Conferencing also maintains a complete record of all that is said and can be reviewed at any time. In addition, conferencing is asynchronous, so time and distance deprive no student of access to learning.

He also indicated that an electronic seminar differs from a classroom seminar. Everything that is said can be preserved for as long as the conferees wish and reviewed by anyone in the conference at any time. No worthy idea is lost because the instructor failed to pick up on it at the time it was expressed. Equally, misstatements are not forgotten.

Also, unless the instructor technically restricts student input, every participant has an equal opportunity to be heard and to be ignored. Classes cannot be dominated by more aggressive students and those who talk, just to talk, tend to feel pressure to be more thoughtful.

It was also indicated that the electronic seminar generates more interaction among members of the class and a greater proportion of student participation compared to that of the instructor.

In another study, Miller (1990) examined the degree to which computer conferencing techniques can be used to enhance personnel development activities.

He concluded that computer conferencing is most appropriate for 1) providing total instruction through technology; 2) supplementing or enriching traditional delivery systems; 3) providing or improving access to new clients or audiences; and 4) reaching distance learners.

Furthermore, he described students' reactions as positive regarding the use of computer conferencing as a vehicle for instruction.

The most frequently mentioned advantage was the ability to participate in an instructional activity based upon a person's unique work schedule. Also students indicated they greatly appreciated the saving of travel time normally required to participate in campus-based courses.

Adapting technology such as computer conferencing

to meet the needs of educators will not be an easy task. In an evaluation of computer conferencing, Abat (1989) reported that:

> Although the students felt generally that computer conferencing enhanced communication during the course, a number felt strongly that computer conferencing should not replace classroom sessions. They expressed a need to have face to face communication with the instructor and fellow students. Within this group a few felt that computer conferencing tended to inhibit rather than promote communication, because the reactions of those addressed by a message stored on the computer could not be judged by the sender immediately, as would be the case with a regular conversation during a discussion in class. (p.14)

Thus, if it is to be successfully utilized, computer conferencing will require resources, commitment, and creativity. It also will require staff development and training to effectively utilize the technology.

Many questions regarding the effectiveness, methodology and design of such projects remain unanswered (U.S. Office of Technology Assessment, 1989).

Additionally, teacher educators will need valid and reliable information regarding the availability of computer technology, as well as the comprehension, utilization, and attitudes of vocational teachers and administrators toward microcomputers. Yeun (1984), examined the understanding and attitudes of 273 Pennsylvania vocational teachers.

He reported that attitudes towards using microcomputers were positively correlated with educational level, microcomputer experience, microcomputer training, utilization of microcomputers, and the availability of microcomputers.

Teachers' attitudes towards the use of microcomputers showed negative relationships with age and service area. In a survey of ten percent of Arkansas' K-12 school principals, Carl and Hoelscher (1984) examined opinions held by principals toward guiding the adoption or rejection of the use of computers within their scope of control.

It was concluded that principals seem to have developed a strong commitment to the belief that computers will have a positive effect on education. Raven and Welton (1989) assessed microcomputer utilization in 87 Kansas vocational agriculture programs to identify current uses of microcomputers.

They concluded that there was a moderate positive correlation between respondent's years of teaching experience and the number of computers in the agriculture department. They also found that the lack of time by instructors to learn more about computers was the primary factor inhibiting the use of microcomputers.

Additionally, they reported that the lack of funding for hardware and software was an inhibitor. Redick, Loyd and Chatraphorn (1989) examined factors that promoted or inhibited the voluntary participation of vocational educators in professional development activities.

They reported that the two personnel development activities ranking highest by amount of time spent and the degree of benefit were: (1) personal activities that lead to professional growth, and (2) college and university in-service activities. Computer conferencing offers the potential for combining these two activities.

Vocational educators in the State of Ohio have been involved in a limited use of computer conferencing. However, information on its availability, utility, and effectiveness as a medium for enhancing and supplementing in-service and personnel development efforts is lacking.

Purpose and Objectives

This study was designed to examine the potential use of computer conferencing to enhance and supplement in-service programs offered for vocational educators in secondary schools (i.e., comprehensive and joint vocational) by the Central Region Vocational Education Personnel Development Center. The broad objectives of the study were to:

1. Determine the availability of resources for conducting personnel development activities by computer conferencing in the Central Region of Ohio.
2. Identify and develop technical and pedagogical topics that could be addressed with computer conferencing techniques.
3. Determine the effectiveness and efficiency of computer conferencing in enhancing and supplementing personnel development activities.

This research and development project was planned for a three-year period consisting of three phases, each phase coinciding with a project year: Phase I—Contextual Analysis; Phase II— Development and Pilot Testing and Phase III—Evaluation and Reporting.

This paper summarizes Phase I, Contextual Analysis, and coincides with the first broad objective. The specific objectives were as follows:

a. To describe the demographic characteristics of vocational teachers and administrators.
b. To determine the availability of computer resources for vocational teachers and administrators.
c. To determine vocational teachers' and administrators' opinions of and competence in using microcomputers.
d. To identify factors underlying vocational teachers' and administrators' attitude toward using computers.

Methodology Design

This study utilized descriptive survey research (Ary, Jacobs, and Razavieh, 1990).

Mailed survey questionnaires were used to determine the availability of microcomputer resources and the perceptions of vocational teachers' and administrators' concerning their microcomputer competence and attitudes toward microcomputers

Populations and Samples

The populations for this study were all secondary vocational teachers (N = 1,341) and administrators including Superintendents, Supervisors, Vocational Directors and Principals (N = 176) located in the 13 Vocational Education Planning Districts in the Central Region of Ohio who were responsible for the vocational programs in their school system during the 1990-91 academic year .

The frame was obtained from the Office of Management Information Systems, the Division of Vocational and Career Education, Ohio Department of Education.

Randomly drawn samples were taken from both vocational teachers (n = 339) and administrators (n = 137) based on Krejcie and Morgan (1970), reflecting a 5% margin of error.

Instrumentation

A questionnaire developed by Yeun (1984) guided the development of the two instruments used to collect the information from vocational teachers and administrators.

The instruments consisted of three sections. Section I was designed to determine the level of perceived microcomputer competence using a five point Likert-type scale ranging from 1=Very Competent to 4=Not at all Competent and 5=Do not know.

Section II was designed to assess opinions about using microcomputers for in-service education using a five point Likert-type scale ranging from 1=Strongly Agree (SA) to 5=Strongly Disagree (SD).

Section III gathered demographic and situational information. A panel of eight graduate students and four faculty members at The Ohio State University assisted in refining items and establishing content and face validity.

The instruments were then pilot tested with a purposefully selected sample of 30 vocational teachers and 30 administrators located outside the Central Region of Ohio in order to establish the reliability of the instrument.

Reliability coefficient were obtained for Section I and II of both instruments. The vocational teachers' instrument had a Cronbach's alpha of .93 on Section I and .87 on Section II.

The reliability coefficient (Cronbach's alpha) obtained for the administrators' instrument was .95 on Section I and .92 on Section II.

The final draft of the instruments contained 18 items in Section I, 37 items in Section II and 10 items for the vocational teachers' questionnaire and 15 items for the administrator's questionnaire in Section III.

Data Collection

Each individual received a packet including a cover letter, questionnaire and a self-addressed, stamped return envelope.

Individuals who had not returned the questionnaires by the end of the second week following the initial mailing received a mail follow-up including a reminder letter, a copy of the cover letter, a questionnaire and a self-stamped return envelope to obtained the questionnaires.

A second follow-up request (included was a second reminder letter and copy of the cover letter, questionnaire, a self-addressed, stamped return envelope) was mailed to the non-respondents at the end of the forth week.

At the end of the sixth week, 72.0% (244) usable responses were obtained from vocational teachers and 78.1% (107) usable responses were obtained from administrators.

As suggested by Miller and Smith (1983), early and late respondents were compared on randomly selected variables in order to address non-respondents.

No significant differences were found between the early and late respondents. Therefore, the results were generalized to the population.

Analysis of Data

The data were analyzed using the SPSS/PC+ statistical program.

Descriptive statistics were used to describe the data relative to demographic characteristics, competence in using computers, and attitudes towards using computers.

Exploratory factor analysis was used to identify factors underlying attitudes towards using microcomputers. Norusis (1988) suggested that factor analysis is used to identify a relatively small number of factors that can be used to represent relationships among sets of many interrelated variables.

Eigenvalues and Scree plots were used to identify breaks or discontinuity in determining the factors. This was followed by a verimax rotation of the factors. An alpha level of .05 was set a priori.

Results

The first objective was to determine the demographic characteristics of the vocational teachers and administrators.

The average age of vocational teachers and administrators in the Central Region (Table 1) was 41.7 (*SD*=8.7) and 45.2 (*SD*=7.4) respectively.

The average number of years worked in public education was 14.2 years (*SD*=8.6) for vocational teachers and 21.3 years (*SD*=6.9) for administrators.

The gender of the vocational teachers and administrators is presented in table 2.

Gender was equally split for vocational teachers, where 50% (122) were female and 50% (122) were male.

Analysis of gender of administrators found 20.6% (22) were female and 79.4% (85) were male.

Table 1. Respondent's Characteristics

	Teachers		Administrators	
Characteristics	Mean	SD	Mean	SD
Age	41.7	8.7	45.2	7.4
Years Worked in Public Education	14.2	8.6	21.3	6.9

Table 2. Respondents' Gender

	Teachers		Administrators	
Gender	Frequency	Percent	Frequency	Percent
Female	122	50.0	22	20.6
Male	122	50.0	85	79.4
Total	244	100.0	107	100.0

The highest educational level (Table 3) reported by vocational teachersindicated that 7% (17) had a high school degree, 4.1% (10) had an associate degree, 48.3% (117) had a bachelor's degree, 40.1% (97) had a master's degree and 0.5% (1) had a doctorate. Administrators reported the following: 2.8% (3) had a bachelor's

degree, 89.7% (96) had a master's degree and 7.5% (8) had a doctorate's degree.

Table 3. Highest Educational Degree of the Respondents

	Teachers		Administrators	
Educational Level	Frequency	Percent	Frequency	Percent
High School	17	7.0	0	0.0
Associate	10	4.1	0	0.0
Bachelor	117	48.3	3	2.8
Master	97	40.1	96	89.7
Doctorate	1	0.5	8	7.5
Missing	2	—	—	0.0
Total	244	100.0	107	100.0

The areas in which vocational teachers taught (Table 4) were as follows: 8.2% (20) in agriculture, 11.9% (29) in business, 7% (17) in marketing, 1.6% (4) in health, 23% (56) in home economics, 22.5% (55) in trade and industrial, 9.4% (23) in occupational work experience, 8.2% (20) in occupational work adjustment, 0.4% (1) in diversified occupations and 7.8% (19) indicated they taught in other areas.

Table 4. Teaching Area of Vocational Teachers

Teaching Area	Frequency	Percent
Agriculture	20	8.2
Business	29	11.9
Marketing	17	7.0
Health	4	1.6
Home Economics	56	23.0
Trade & Industrial	55	22.5
Occupational Work Experience	23	9.4
Occupational Work Adjustment	20	8.2
Diversified Occupations	1	0.4
Other	19	7.8
Total	244	100.0

Positions held by administrators (Table 5) are reflected by the following: 18.7% (20) were vocational directors, 19.7% (21) were supervisors, 54.1% (58) were principals, 3.7% (4) were superintendents and 4.7% (5) reported to have other positions.

Table 5. Administrative Positions of Administrators

Position	Frequency	Percent
Vocational Director	20	18.7
Supervisor	21	19.7
Principal	58	54.1
Assistant Supt.	0	0.0
Superintendent	4	3.7
Other	5	4.7
Total	108*	100.0

*respondents were able to report holding more than one position.

In addressing the second objective of the study, availability of microcomputer resources (Table 6), it was found that 48.1% (116) of the vocational teachers and 55.1% (59) of the administrators owned a computer. When responding to the questions about modems, 11.5% (28) of the vocational teachers and 13.1% (14) administrators reported to have access to a modem at home. In addition, 15.6% (38) of the vocational teachers and 43.9% (47) of the administrators indicated that they access to a modem at their school. Analysis of school microcomputer resources found that 52.2% (111) of the vocational teachers reported that their school provided them with their own computers, 44.8 (99) reported having to share a computer with other teachers or students, and 5.0% (11) indicated that their school does not provide them with a computer.

Sixty-one point four percent (62) of the administrators reported that their school provided them with their own computer, while 30.7% (31) reported to share a computer with other administrators, and 7.9% (8) reported that their school does not provide them with a computer.

Table 6. Availability of Microcomputer Resources

	Teachers		Administrators	
Computer Resources	Frequency	Percent	Frequency	Percent
Own a microcomputer	116	48.1	59	55.1
Have a modem at home	28	11.5	14	13.1
Have a modem at school	38	15.6	47	43.9
Schools provide individuals with a computer	111	50.2	62	61.4
Schools provide a shared computer	99	44.8	31	30.7
Schools do not provide a computer	11	5.0	8	7.9
Missing	23	—	6	—
Total	244	100.0	107	100.0

The type of computer training vocational teacher reported to have received (Table 7) were as follows: 34.3% (68) reported to have been self-taught, 23.7% (47) indicated they received individual instruction on a one to one basis, and 32.8% (65) reported to have attended workshops, seminars or courses in computer training.

Other forms of training were reported by vocational teachers, 3.0% (6), where as, 6.1% (12) reported to have had no instruction in computers. Administrators indicated the following: 40.0% (38) reported to have been self-taught, 16.8% (16) had received individual instruction, 30.5% (29) had received instruction from workshops, seminars, or courses and 3.2% (3) indicated they had other forms of training, where as, 9.5% (9) indicated they had received no instruction in computers.

Table 7. Type of Computer Training Received

	Teachers		Administrators	
Computer Training	Frequency	Percent	Frequency	Percent
Self-taught	68	34.3	38	40.0
Individual instruction	47	23.7	16	16.8
Workshop, Seminar or Courses	65	32.8	29	30.5
Other	6	3.0	3	3.2
No instruction	12	6.1	9	9.5
Missing	46	—	12	—
Total	244	100.0	107	100.0

Five items were selected from the questionnaire to represent vocational teachers' and administrators' interest in using microcomputers for in-service education.

Respondents reacted to the statements using a numerical scale ranging from 1=strongly agree (SA) to 5=strongly disagree (SD).

The mean score and standard deviation are reported for each item (Table 8).

The items, mean and standard deviation were as follows: (1) the use of microcomputers can improve the quality of in-service programs — 2.04 (*SD*=.82) for vocational teachers and — 2.00 (*SD*=.78) for administrators; (2) schools should have microcomputers available for in-service education — 1.97 (*SD*=.74) for vocational teachers and — 1.84 (*SD*=60) for administrators; (3) the use of microcomputers for in-service education should be encouraged — 1.95 (*SD*=.74) for vocational teachers and — 1.91 (*SD*=.64) for administrators; (4) using microcomputers would add interest to in-service programs — 2.15 (*SD*=.78) for vocational teachers and — 2.14 (*SD*=.61) for administrators; (5) the use of microcomputers for in-service education should occur in your vocational area — 1.98 (*SD*=.72) for vocational teachers and — 1.87 (*SD*=.62) for administrators; and (6) microcomputers provide a supplemental instructional approach to in-service education — 2.07 (*SD*=.70) for vocational teachers and — 2.00 (*SD*=.48) for administrators.

The respondents agreed with the items, indicating an interest in using microcomputers for in-service education.

Table 8. Teachers' and Administrators' Interest in Microcomputers for In-service Education

Item	Teachers Mean	Teachers SD	Administrators Mean	Administrators SD
The use of microcomputers can improve the quality of in-service programs.	2.04	.82	2.00	.78
Schools should have microcomputers available for in-service education.	1.97	.74	1.84	.60
Use of microcomputers for in-service education should be encouraged.	1.95	.74	1.91	.64
Using microcomputers would add interest to in-service programs.	2.15	.78	2.14	.61
The use of microcomputers for in-service education should occur in your vocational area.	1.98	.72	1.87	.62
Microcomputers provide a supplemental instructional approach to in-service education.	2.07	.70	2.00	.48

Additionally, administrators' willingness to support vocational teachers for microcomputer in-service is reported in table 9. It was found that 69.2% (74) administrators are willing provide release time for their vocational teachers to attend a microcomputer in-service.

While 18.7% (20) of the administrators reported their willingness to support long distance telephone calls associated with microcomputers. Twenty-two point four percent (24) administrators reported their support of microcomputer communication hook-up costs.

When questioned about the acquisition of microcomputer hardware and software, 31.8% (34) and 37.4% (40) of the administrators supported these cost respectively.

Further, 19.6% (21) indicated their willingness to provide their vocational teachers with a telephone line for microcomputer communication, while only 8.4% (9) indicated that they would not support any of the mentioned costs.

Table 9. Administrators' Willingness to Support Vocational Teachers for a Microcomputer In-service

Expenses	Frequency	Percent
Release time	74	69.2
Long distance telephone calls associated with microcomputers	20	18.7
Microcomputer communication hook-up cost	24	22.4
Acquisition of required microcomputer hardware	34	31.8
Acquisition of required microcomputer software	40	37.4
Acquisition of a telephone line for microcomputer communications	21	19.6
None of the expenses listed	9	8.4

In addressing the third objective it was found that, on a scale of computer competence ranging from 1=not at all competent to 4=very competent, vocational teachers ranged from 2.04 to 3.74. Administrators' competence ranged from 2.21 to 3.96 (Figure 1).

Thus, vocational teachers and administrator perceived themselves to be somewhat competent in the use of microcomputers.

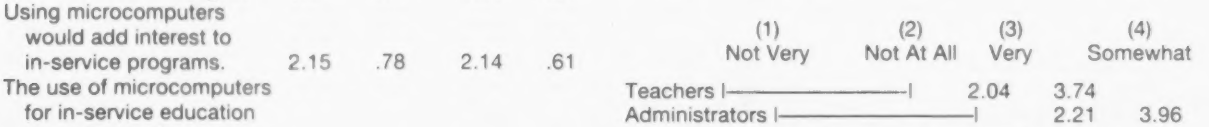

Figure 1. Range in Perceived Computer Competence

In addressing the fourth objective of the study, an examination of the Eigenvalues and their Scree plots resulted in the selection of four factors accounting for 56.5% of the variance in the attitude vocational teachers have towards using microcomputers (Table 10).

The four factors and the percent of variance accounted for include: (1) educational applications of microcomputers—39.8%, (2) personal apprehensions toward using microcomputers™-7.0%, personal moti-

vation for using microcomputers—4.9%, and (4) professional/work context—4.8%.

Table 10. Factors Influencing Teachers' Attitude Toward Using Microcomputers

Cumulative Factors Explained	Proportion of Variance	Percent
1. Educational application of microcomputers	39.8	39.8
2. Personal apprehensions towards using microcomputers	7.0	46.8
3. Personal motivation for using microcomputers	4.9	51.7
4. Professional/work context	4.8	56.5

Two examples are given for each of the four factors and are presented below.

For the *educational application of microcomputers* factor, the items and their factor loading include:

The use of microcomputers can improve the quality of in-service programs. (.72)

The use of microcomputers would improve my instructional effectiveness. (.56)

The *personal apprehensions towards using microcomputers factor* consisted of the following two items and their factor loadings:

The thought of using microcomputers to communicate/network with people I can't see frightens me. (-.66)

Microcomputers are too mechanical for me to use. (-.51)

The *personal motivation for using microcomputers* factor include the following two items and their factor loadings:

I have a personal interest in learning about microcomputers. (.69)

I have an interest to learn about microcomputers to enhance student learning. (.60)

The final factor, *professional/work context* include the following two items and their factor loading:

I consider myself informed about the use of microcomputers in my field. (.75)

I am knowledgeable about commercially produced microcomputer programs available for my subject matter area. (.73)

Four factors were determined to account for 51.8% of the variance in the attitude administrators have toward using microcomputers (Table 11). The four factors and the percent of variance accounted for include: (1) administrative applications of microcomputers—32.5%, (2) instructional benefits of microcomputers for in-service education—7.8%, (3) personal apprehensions toward using microcomputers—6.4%, and (4) personal motivation for using microcomputers—5.0%.

Table 11.Factors Influencing Administrator's Attitude Toward Using Microcomputers

Cumulative Factors Explained	Proportion of Variance	Percent
1. Administrative applications of microcomputers	32.5	32.5
2. Instructional benefits of microcomputers for in-service education	7.8	40.3
3. Personal apprehensions towards using microcomputers	6.4	46.7
4. Personal motivation for using microcomputers	5.0	51.8

Two examples are given for each of the four factors and are presented below.

For the *administrative applications of microcomputers* factor, the items and their factor loading include:

Microcomputers are a flexible medium for administrative work. (.56)

The use of microcomputers would improve my administrative effectiveness. (.56)

The *instructional benefits of microcomputer for in-service education* factor consisted of the following two items and their factor loading:

The use of microcomputers can improve the quality of in-service programs. (.72)

Schools should have microcomputers available for in-service education. (.69)

The *personal apprehensions toward using microcomputers* factor contained the following two items and their factor loading:

The thought of using microcomputers to communicate/network with people I can't see frightens me. (-.66)

Microcomputers are too complicated for me to use. (-.51)

The final factor *personal motivations for using microcomputers* contained the following two items and their factor loading:

I would be interested in trying alternative instructional methods for in-service education. (.64)

I would be willing to use microcomputers to send electronic mail messages. (.51)

CONCLUSIONS

Based on the finding of the study, the following conclusions have been formulated:

1. Vocational teachers and administrators are "somewhat" knowledgeable about computers.
2. Vocational administrators are somewhat willing to provide teachers with release time for microcomputer in-service programs.
3. Vocational teachers agree that microcomputers can and should be used for in-service programs.
4. Vocational teachers and administrators have computers available for their use.
5. Vocational teachers and administrators do not have ready access to modems.
6. Vocational teachers' attitude toward using microcomputers are influenced by the following factors: perceptions of educational applications, personal apprehensions, personal motivations, and professional/work context for using microcomputers.
7. Vocational administrators' attitude toward using microcomputers are influenced by the following factors: perceptions of administrative applications, instructional benefits, personal apprehensions, and personal motivations for using microcomputers.

RECOMMENDATIONS

Based on the findings and conclusions drawn from this study, the following recommendations are suggested:

1. Teacher educators should develop and field test curriculum using computer conferencing for in-service education programs offered to vocational teachers and administrators located in Ohio's Vocational Education Personnel Development Center for the Central Region.
2. Modems should be made accessible to teachers and administrators involved in the field test of computer conferencing for in-service education.
3. The computer conferencing curriculum should: include information at an intermediate level, emphasize the educational applications and instructional benefits of microcomputers, reduce microcomputer anxiety, and reinforce existing levels of knowledge and competence.

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